NATUR CYMRU

A Review of WILDLIFE in Wales

Rhif/Number 14 • Spring/Gwanwyn 2005

- Any way the wind blows
- Tracking turtles to Welsh waters
- Gardening with birds in mind
- Y Grug a'r Caerau
- Rivers of life – river restoration
- A story of river flies
- Y Carneddau – tirlun ddoe a heddiw
- Farming to keep carbon
- Reeds meet needs
- Islands round-up

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Golygyddol

Wrth ysgrifennu hwn, rwy'n edrych ymlaen at gynhesrwydd cynyddol haul y gwanwyn ar fy wyneb, ar un o'r dyddiau hynny sydd fel y diwrnod cyntaf allan ar ôl salwch hir, sy'n meddwi'r synhwyrau, gydag arogl hyfryd y blodau newydd ar y coed wedi ei gyfuno gydag egrwch glaswellt wedi ei dorri. Rwyf hefyd yn cofio am y drefn a gollwyd o ymweld â'r cychod gwenyn, dinasoedd o bryfed a ddeffrowyd i weithgaredd cynddeiriog. Ffrydiau o wenyn yn dathlu eu goroesiad, yn gweld ble maen nhw o'r newydd, a dychwelyd gyda stumogau llawn neithdar a basgedi o baill llachar ar eu coesau.

Ffoto: Asiantaeth yr Amgylchedd/Environment Agency.

Wedi dioddef blynyddoedd o bigiadau a cheginau sticlyd 'dydw i ddim yn siwr beth ynghylch y gwenyn yr ydw i yn ei golli cymaint, ers i'r gwiddonyn 'varroa' ladd yr heidiau. Ai eu diwydiant, eu pensaernïaeth, eu cymuned gydweithredol ac anhunanol neu ai eu cynhyrchiant a edmygaf? Efallai ei fod yn rhywbeth llai ymenyddol, mwy emosiynol. Bu i'r cartref a ddarperais iddynt, yr agosrwydd y bu i mi ei orfodi arnynt i dynnu fy ngwobr, greu cysylltiad rhyngom; roedd yn ddigon, ar y boreau hynny o wanwyn, i gynhyrchu sbarc, ymchwydd sydyn a rhyfeddol o'r cyffro o fod yn fyw.

Mae'n fendith profi eiliadau o'r fath, efallai wrth weld brain coesgoch yn chwarae ac yn plymio uwch ben clogwyn, neu lamidyddion yn brigo i'r wyneb am eiliad mewn môr tymhestlog, neu o wybed Mai yn dawnsio uwchben dyfroedd berw hoff afon. Mae'n bleser hefyd cael eich atgoffa o eiliadau o'r fath. Bu i ddisgrifiad Michael Hammet o bryfed Mai, pryfed y cerrig a'u tebyg nid yn unig gynyddu fy ngwybodaeth am y pryfed hyn, ond fy nwyn yn ôl at y synau a'r symudiad a brofwch wrth fod ar lan afon. Ac mae mwy am afonydd yn y rhifyn hwn, gyda disgrifiad o waith sy'n cael ei wneud i wella rhan uchaf Afon Hafren ac Efyrnwy er budd pysgod, natur a phobl.

Mae'n ymddangos fod mwy o gyllid ar gael y dyddiau hyn ar gyfer prosiectau cadwraeth a all gyfiawnhau eu hunain mewn termau iwtilitaraidd, felly mae gennym fwy o storïau am newyddion da nag erioed o'r blaen. Mae'r holl weithgaredd hwn yn peri i mi gofio am y gwenyn egnïol hynny y dechreuais fy erthygl â nhw. Er gwaethaf cymhlethdod rhyfeddol eu trefn gymdeithasol, y celloedd hecsagonal y mae'r gweithwyr yn eu hadeiladu, y modd y maent yn symud o gwmpas ac yn y blaen, maent yn rhan o ac yn cyfrannu at fywydau eraill. Maent yn gwneud eu rhan. Maent yn peillio'r planhigion hynny y maent yn casglu eu paill a'u neithdar.

Dyna sut y dylai pethau fod i ni hefyd. Mae hanes y töwr, y mae ei sgiliau yn troi brwyn yn doeau, hefyd yn gwneud ei ran ac yn rhan o'r amgylchedd. Mae'n dangos beth sy'n bosibl os defnyddiwn ein sgiliau a'n dyfeisgarwch i fod yn bartneriaid gyda natur. Rydym ni yn ennill, mae'r corsleoedd a'u bywyd gwyllt yn ennill, a chaiff cydbwysedd ei adfer. Gall gymryd amser hir i gyflawni perthynas o'r fath, ond efallai'n wir mai dyma'r unig ddewis tymor hir sydd gennym.

James Robertson

Editorial

Writing this, I am anticipating the warmth of the strengthening spring sun on my face, on one the those days which are like the first day out after a long illness, dizzying the senses, the sweet smell of new blossom laced with the astringency of cut grass. I am also remembering the lost ritual of visiting my bee hives, insect cities awakened into frenetic activity, streams of bees celebrating their survival, taking their bearings anew, and returning home with stomachs filled with nectar and baskets of bright pollen on their legs.

Having suffered years of stings and sticky kitchens, I am not sure what it is about honey bees that I miss so much, since the varroa mite did for my colonies. Is it their industry, their architecture, their cooperative and selfless community or their productivity that I admire? Perhaps it is something less cerebral, more emotional. The home I provided for them, the intimacy I forced upon them to extract my reward, created a connection between us; it was enough, on those spring mornings, to generate a spark, a sudden up-welling of the sensation of being alive.

It is a blessing to experience such moments, perhaps at the sight of choughs cavorting and tumbling above a cliff, of porpoises fleetingly breaking surface in a choppy sea, or of mayflies dancing over the swirling waters of a favourite river. It is also a joy to be reminded of such moments. Michael Hammett's account of mayflies, stoneflies and their ilk not only increased my knowledge of these insects, but took me back to the sounds and movement of being by a river. And there is more on rivers in this issue, with a description of the work that is being done to improve the upper Severn and Vyrnwy rivers, to the benefit of fish, nature and people.

There seems to be more funding around these days for conservation projects which can justify themselves in utilitarian terms, so we have more good news stories than ever before. All this activity puts me in mind of those energetic bees I started with. For all the fascinating complexity of their social organisation, the hexagonal cells workers construct, the way they navigate and so on, they are part of, and contribute to, other lives. They fit in. They pollinate the plants whose pollen and nectar they collect.

That is the way it should be for us, too. The story of the thatcher, whose skills turn reeds into roofs, is also one about fitting in and being part of the environment. It shows what is possible if we use our skills and ingenuity to be partners with nature. We gain, the reed beds and their wildlife gain, and balance is restored. It may be a long haul to achieve such a relationship, but it may be the only long-term option we have.

James Robertson

Photo: Ian Nichols.

Any way the wind blows
wind farms and wildlife

The largest wind turbine site in the world at Altamont Pass, California. Photo: Aaron Brown.

Wind farms generating much needed sustainable energy, or despoilers of natural beauty and blots on the landscape? Whichever view you hold of onshore wind generation, it is hard to find the middle ground. ***Andrew Lucas*** *picks his way through the minefield to examine some of the issues affecting nature.*

There can be few developments in recent years that have stirred as much controversy amongst environmental organisations as onshore wind turbines. It is a confrontation regularly fought out in the press. When proposals for wind turbine sites around Swansea were announced, the local paper described them as a 'Ring of Steel' around the city, and provoked a storm of protest in its letters pages. Supporters of wind energy have hit back. George Monbiot described David Bellamy, one of the most vociferous critics of climate change research, as a "former environmentalist"[1], whilst Polly Toynbee described anti-wind protest groups as "…small, short-sighted and selfish, yet noisily influential through the unrepresentative Tory press"[2]. Even the use of language has become important. Supporters prefer the benign 'wind farm', whilst opponents opt for the emotive 'wind turbine power station'.

In the main, biodiversity has been a 'bit part' player in this struggle, which has been largely centred on landscape. However, wind energy has implications for habitats and species, both during construction and operation. Here, I'll try to examine what wind power could mean for wildlife, and for the organisations that seek to protect it.

Birds, bats and wind power

Bird strike has been one of the most significant areas of concern, and has two particularly notorious cases. The Wind Resource Area at Altamont Pass lies some 50 miles east of San Francisco. It is massive – at 7,000 turbines, it is the largest wind turbine site in the world, and easily dwarfs the largest site in Britain, a 140-turbine proposal near Glasgow. However, it has become

infamous for the large number of birds of prey killed there. A US environmental group has filed a lawsuit against the owners claiming that 10,000 birds have been killed in 20 years of operation, including species such as golden eagle, red tailed hawk, American kestrel and ferruginous hawk[3]. At Tarifa, in Andalucia, high numbers of birds have also been killed.

Altamont and Tarifa lie on important migratory routes for relatively large, slow moving birds of prey travelling between breeding and wintering grounds. As a result, significant numbers of birds pass both sites every year. But bird strike is by no means a simple issue. At Altamont, 25% of turbines are responsible for the majority of bird deaths. Moreover, some turbines seem to 'specialise' in certain species, with those located in canyons tending to kill golden eagles, whilst more red tailed hawks are killed by turbines on steep slopes[4]. At Tarifa, most of the casualties have been resident griffon vultures, with migratory species such as black kites and white storks generally passing high above the site. By contrast, the local vultures fly at much lower levels and closer to the turbines, possibly because they are more accustomed to them – familiarity breeding contempt[5]. Both Altamont and Tarifa are relatively 'old' wind turbine sites, and demonstrate the folly of poorly situated turbines in important bird areas. It is a fiasco that the industry has had to live with ever since.

However, the majority of studies have shown very low numbers of birds killed as a result of collisions with turbines[6]. Collision rates of 1.34 birds per turbine per year were recorded at Blyth Harbour, whilst studies from the Netherlands suggest a mean daily collision rate of less than 0.1 birds per turbine in autumn and spring. Collision rates were highest in the autumn and winter period, and were greatest during nights with poor visibility. These rates may be considered low, but the cumulative impact could affect populations of species that are already scarce. Wind turbines definitely kill some birds. The brutal question is, "Do they kill enough to matter?"

Concern regarding birds extends beyond the question of collisions. Birds will fly around wind turbines when they can see them, so that significant arrays of turbines may form a barrier to movement. Turbines sited in nesting or feeding habitat could affect bird populations, but once again, evidence is mixed. In the Netherlands, there is evidence that some species, particularly curlew, feed and roost less frequently around wind turbines, both during construction and subsequent operation, whilst other species remained unaffected. At Blyth, nine wind turbines appear to have had no long-term effect on cormorants, purple sandpipers or gulls that use the estuary, although cormorants did decrease during construction. A study of ten upland turbine sites in the UK did not demonstrate any decline in moorland breeding birds. For instance, there was no significant difference in the populations of skylark and meadow pipits between wind turbine and control sites.

If data on birds is sparse and contradictory, information on bats is almost non-existent. There is some evidence from America of significant kills of migratory bats such as red bat, hoary bat and little brown bat at particular sites where animals are concentrated[7]. British bat species are thought to be less at risk because, with the exception of Nathusius' pipistrelle, they are not migratory[8]. Most are woodland species, so might not be expected to come into contact with turbines mainly situated on open moorland. But some species do use cave systems in upland areas as hibernation sites, notably on Mynydd Du, Carmarthenshire, so potential disturbance or collision cannot be ruled out. However, any effects would be difficult to prove. Researchers in America have found it hard to study passerine bird deaths at wind turbines because corpses are readily scavenged. If a turbine hit a bat as small as a pipistrelle, there may not be a lot left to recover!

Habitats and wind power

Evidence of significant damage to habitats is scant in the UK, mainly because the industry is in its infancy, and habitat change has yet to show itself. The RSPB has dismissed the land take for turbines, which includes footings for the turbines themselves, plus access roads and associated infrastructure, as relatively insignificant for bird conservation. Since most Welsh upland sites are already in poor condition due to overgrazing[9], it can be argued that there is little left to lose. Noise is unlikely to be a factor, given the way many species can become habituated to the din of motorways. Nonetheless, turbine development could affect habitats in a number of ways. Servicing means that previously remote sites become much more visited. Access tracks provide routes in for other activities such as off-road biking. Some habitats, such as flushes and springs, may be quite local in upland areas but support specialist species, and be susceptible to one poorly placed turbine. And some

upland habitats such as blanket mire and wet heath are especially fragile. Environmental groups in Spain have opposed some turbine developments, because of concern for bog habitats[10]. So there is evidence for both opponents and supporters of wind power. One shortcoming of most studies is the absence of 'before and after' data for the same sites, making interpretation difficult. This highlights the need for good science to be 'built in' to wind turbine developments from the start.

The environment movement and wind power

Wind energy has exposed a schism in the broad environmental church. This divide has always existed – Jonathan Porritt identified it twenty years ago when he wrote about "Conservationists/Traditionalists", "Radical Libertarians" and "Reformists"[11]. Previously, these factions had no issue over which to fight. Now they do, with the risk that the biodiversity message may become confused in a public mind that does not, despite what we might hope, put such issues at the top of the agenda.

'Carbon dinosaur.'
Photo: Friends of the Earth, Scotland.

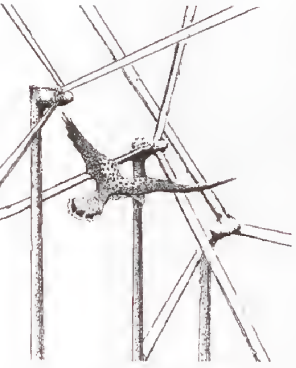
In one corner is Country Guardian. A small group with only 300 members, it has proved itself an effective umbrella organisation for local protest groups across Britain. Opponents have made an unconvincing attempt to portray the group as stooges of the nuclear industry. In fact, Country Guardian has more in common ideologically with the general sense of rural frustration, caused by the countryside's declining political influence. Mainstream organisations that share Country Guardian's misgivings, at least in part, include the Campaign for the Protection of Rural Wales and the National Trust, together with local groups such as the Gower Society and the Snowdonia Society.

Protest groups are adept at using newspaper letters columns as a campaigning tool, and consistently 'out write' supporters of wind power. However, the wind industry complains that this gives a misleading impression because, it claims, just 12 people are responsible for a quarter of all 'anti' letters published in the UK press[12]. To test this, I analysed the letters column of the Swansea local paper, the South Wales Evening Post. In 2004, which coincided with the Scarweather decision and new plans for wind turbines around the city, the paper published 191 letters hostile to wind power. Of these, 44% were written by 6 people, with a single individual responsible for 12% of the letters, despite living well beyond the circulation area of the paper. This suggests that a small number of vocal people are indeed having a disproportionate effect on the debate.

Opposing them are Friends of the Earth (FoE) and Greenpeace. Wind power has placed these charities in uncharted waters – supporting industry against small local protest groups that are usually their campaign bedrock. They have struggled to find an appropriate tactic to confront a new opposition, and have discovered that it is much easier to motivate people to be 'against' something than 'for' it. Both advocate wind as part of a wider strategy to use renewable energy of all kinds, and achieve significant change in society. Whilst FoE insists on proper assessment of environmental impacts of wind turbines, it does not think that the mere presence of an SSSI should preclude a wind power development[13]. It is hard to imagine FoE being quite so sanguine about any other development in similar locations.

Between the two are organisations like RSPB and the Wildlife Trusts. RSPB has been strongly supportive of proposals to tackle climate change, which it sees as one of the major challenges to bird conservation. It has its own green energy scheme that supplies energy from hydroelectric, wind and landfill gas, in association with Scottish and Southern Electricity. However, it reserves the option to object at sites where it considers the risk to birds unacceptably high[14]. The Wildlife Trusts have similarly given a general welcome to the development of onshore wind power, although they do demand rigorous environmental scrutiny[15]. It is a thoughtful approach, but leads to criticism for inconsistency by opposing camps or, in the case of the RSPB, accusations of being 'bought off' by the energy industry.

Overall, competent science is essential, because otherwise supporters and opponents of wind energy will simply pick the case study that backs their own prejudice. But as the UK dash for wind energy gathers apace, will there be time to build it into future developments?



We cannot get ourselves off the horns of this dilemma by simply opting for a different 'green' energy source. All have their technical and environmental drawbacks. Tidal power requires complex and expensive engineering projects in some of our most internationally important estuaries. Hydroelectricity is severely limited by site availability, and could damage nationally important bryophyte communities. Solar power offers some solutions on new buildings, if national and local government would insist on it. On existing properties it is beyond the pocket of most householders.

At a recent TUC energy conference[16], the opinion of industry analysts was that only a variety of sources could give us the reliability of supply we need. Wind has a role, but other sources will also be required, which could include biting the nuclear bullet. However, supply-side solutions are only part of the answer. We also need to cut our production of CO_2, from both electricity generation and road traffic. But in a country where energy demand continues to grow year on year, and where petrol protestors can bring the nation to halt, what politician is prepared to contemplate that?

Andrew Lucas has had a varied environmental career, and currently works for the Countryside Council for Wales. The views in this article are his own.

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3 *Legal Action Against Altamont Bird Kills – Environmentalists Get Tough*. Wind Power Monthly, February 2004
4 Thelander, C.G., Smallwood, K.S. and Rugge, L. (2003). *Bird Risk Behaviors and Fatalities at the Altamont Pass Wind Resource Area, March 1998 – Dec 2000*. National Renewable Energy Laboratory, Golden, Colorado
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12 See www.britishwindenergy.co.uk/pdf/trendsbwea24.pdf
13 *Wind power: your questions answered*. Friends of the Earth
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15 *Windfarm Impact Upon Wildlife*. Wildlife Trusts Press Release, 5 April, 2001
16 *Could the Lights Go Out Here?* TUC one day conference, Cardiff, September 2004

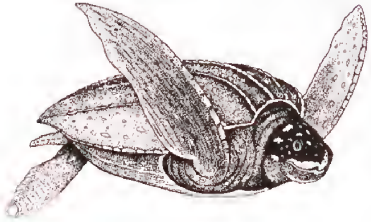
Awelon croes i fywyd gwyllt?

Beth yw effaith ffermydd gwynt ar fywyd gwyllt? Mae'r dystiolaeth yn brin a chymysg. Ag eithrio'r datblygiadau sy'n gorwedd ar lwybrau mudo pwysig, ychydig o adar sy'n cael eu lladd gan y tyrbinau – ond a ydy 'nifer fechan' yn 'ormod'? Nid oes darlun clir chwaith o effaith tyrbinau ar symudiad lleol adar a'u defnydd o diroedd bwydo a nythu. A beth am ystlumod? Mae rhai o'r rhain hefyd yn mudo i glwydfannau yn yr ucheldir ond anodd fyddai canfod tystiolaeth o unrhyw niwed. Er nad yw ffermydd gwynt yn llyncu llawer o dir, gallant ddifrodi cynefinoedd bregus a lleol iawn, fel tarddiadau a gallant greu sgîl-effeithiau arwyddocaol, er enghraifft drwy hwyluso mynediad ar gyfer gweithgareddau fel beicio tir garw. Mae prinder data o gyfnodau cyn ac ar ôl adeiladu ffermydd gwynt yn llesteirio ein dealltwriaeth o'u heffeithiau gwirioneddol ar fywyd gwyllt – rhaid cynnal astudiaethau gwyddonol yn gynnar yn hanes unrhyw ddatblygiad. Mae ynni gwynt wedi creu rhaniadau ymhlith mudiadau amgylcheddol ac mae peryg i effaith ynni gwynt ar fioamrywiaeth fynd ar goll ynghanol y cecru. Mae'r awdur yn amau na fydd amser i roi ystyriaeth deg i wyddoniaeth yn y ras i ddatblygu ynni gwynt.

Tracking turtles to Welsh waters

The largest recorded leatherback, measuring nearly 3 metres.
Photo: CCW/NMCW

The crucial moment in a turtle's life, tradition has it, is when a female comes ashore to lay her eggs, only to find the beach has been taken over by holiday-makers. But life on the ocean is full of danger for the greatest sea turtle of all, the leatherback. Research has uncovered an extraordinary story of long distance travel in pursuit of flotillas of jellyfish, which puts Wales firmly on the map of desirable locations for a leatherback turtle, as ***Jonathan Houghton*** *explains.*



Most of us will have seen photographs and footage of leatherback turtles cruising effortlessly through crystal blue tropical waters. We assume that they do not inhabit our seas; it's much too cold, isn't it? Quite remarkably, these giant reptiles may be as much at home around the coast of Wales as anywhere in the world! Before telling the story of how this has become apparent, I will begin by describing the species in question.

Of the seven species of marine turtles found in the world's oceans, leatherback turtles are the largest and most widely distributed. In the Atlantic they breed in the wider Caribbean region and west Africa, where they haul themselves onto tropical beaches every two or three years to lay up to 11 clutches of eggs containing around 100 eggs in each. Adult leatherbacks can reach an enormous size, with the largest ever specimen washing up on Harlech beach in the late 1980s, measuring an amazing three metres (10 ft) and weighing 916 kg (2016 lb). Despite this, these giant reptiles are not voracious predators but planktivorous, feeding almost exclusively on gelatinous zooplankton, namely jellyfish, salps and ctenophores.

The gap in our knowledge

As with many marine mega-faunal species, actual and projected population declines of leatherback turtles have attracted a great deal of international concern. This trend has been largely attributed to incidental by-catch in oceanic longline fisheries and may ultimately lead to regional extinction in areas such as the Pacific Ocean within the next few decades. This encapsulates a longstanding problem, that in trying to conserve these ancient species our efforts have historically been skewed towards the nesting beaches, where the animals were easily accessible, with their 'at-sea' behaviour remaining largely unknown.

Our first tentative steps towards understanding leatherbacks away from the nesting beach came about through the satellite tracking of female turtles at the end of the breeding season. This approach has allowed researchers to identify incredible migratory pathways between nesting and foraging sites that often span thousands of miles. Nonetheless, one problem still remained: early satellite transmitters allowed us to know where animals were, but we had no idea what they were doing. This was to prove a major limitation for many years, until the recent development of a new generation of transmitters by the Sea Mammal Research Unit. These Satellite Relay Data Loggers (SRDLs), as they were known, provided additional information such as dive depth and duration, swim speed, light levels and water temperature. Now, for the first time, we were able to find out what these animals were doing once they entered the water at the end of their breeding season.

Satellite Relay Data Logger attached to female leatherback in Grenada.

Photo: INTERREG IIIA – Irish Sea Leatherback Turtle Project.

Pan-Atlantic movements

In 2002 and 2003 a team from the University of Wales Swansea set off to Grenada in the West Indies with the aim of recording broad-scale oceanic movements and dive behaviour for leatherback turtles. This study proved to be a major breakthrough in our understanding of this most elusive species.

As individuals moved from the Caribbean out into the Atlantic, their diving behaviour began to change. In particular, in the Atlantic, where foraging success was expected to be higher than in the more nutrient depleted Caribbean basin, dives correspondingly became much longer. We also observed a distinct daily pattern, with leatherbacks spending much of the night diving, typically to modest depths, but then around dawn the dives became progressively deeper. In the oceanic Atlantic, this resulted in the deepest ever dive record for any reptile, with a 54-minute dive to 626 metres on 26 August 2002! Such behavioural information, while of immediate interest to marine biologists, surely doesn't help in the real world of species conservation? In fact it does, as knowing the depth to which an animal dives when feeding or travelling in the open sea is vital in our efforts to reduce the interaction of leatherback turtles with open-water fisheries.

However, its usefulness does not end there, as the combination of behavioural information and location provides evidence of the nature of their migration itself. For example, two of the turtles that left the Caribbean towards the end of the breeding season travelled east towards West Africa, whilst those that left later travelled in a general northerly direction. Two travelled north-west to within a few hundred kilometres of Cape Cod and Nova Scotia, while the other five went north-east, reaching northerly latitudes between the Azores and the UK. In October, as the northerly waters cooled, these turtles all turned south to over-winter in intermediate latitudes, whilst those that bred late in the season appeared to remain in the tropical Atlantic for most of the following year. Though we need to shadow the turtles for longer to understand their full three-year journey from and back to their breeding sites, the tracking carried out so far shows that turtles spend considerable periods of time in the northern Atlantic. Our coast, it would seem, is well within their normal foraging range, and they are attracted here by food, which must be more abundant in the northern Atlantic than the Caribbean.

Turning our attention to home

Following on from our work in the West Indies, the Irish Sea Leatherback Project was established in April 2003 as a joint venture between the University of Wales Swansea and the University College Cork. Key elements of the project included aerial surveys to quantify leatherback abundance around Wales and Ireland, satellite tracking, shoreline jellyfish surveys, schools workshops and public seminars. Through this we hoped to address the long-unanswered question of whether leatherbacks in our waters were merely oceanic wanderers or represented an integral part of our natural heritage.

As we approach mid-point of our work on the Irish Sea, the most significant breakthrough has surprisingly come about through the aerial surveys. Incredibly, we found that not only could we locate and observe leatherbacks from the air, but also the elusive jellyfish aggregations that constitute their principal prey. Indeed, the observation of leatherback turtles in the vicinity of extensive jellyfish aggregations has triggered further research into how they are able to survive on such a low energy and seasonal food source. Boat-based studies validate aerial sightings, make direct observations of foraging leatherbacks and investigate the factors underpinning vast jellyfish aggregations.

Compass jellyfish Chrysaora hysoscella. Photo: Rohan Holt.

As a starting point for our surveys, we set about mapping the distribution of historical sightings of leatherbacks that had been painstakingly compiled by Rod Penrose from Marine Environmental Monitoring (http://www.strandings.com). This revealed some possible hotspots of leatherback activity along the Welsh and eastern Irish coasts, and gave us an idea of where to begin. However, while this anecdotal information was extensive, we couldn't be sure whether six separate sightings within a short period of time were the same animal seen six times or six of one hundred turtles actually present.

So, to complement the existing database with some quantitative results we took to the skies and surveyed a number of areas where sightings were plentiful and a number of previously undocumented areas in the open sea. This involved flying a plane along set transects at a height of 150m and recording the numbers and locations of any turtles, jellyfish and an array of other marine megafauna that we came across.

Data gathered over the last two years is starting to reveal that between April and November densities of the large (up to 80cm across) barrel jellyfish *Rhizostoma octopus*, in both Carmarthen and Tremadoc Bays in Wales and Rosslare in Ireland, sometimes reached one every few square metres; other species were distributed more widely throughout the Irish Sea. What makes the barrel jellyfish bloom in the bays remains uncertain, but these areas all receive constant supplies of nutrient-rich sediments from the estuaries that empty into them, which could help create favourable conditions. More importantly, the locations of major jellyfish blooms overlapped surprisingly well with the potential hotspots highlighted in Rod's database, which got us thinking that the distribution of turtles in our waters may not be as random as we once thought.

In parallel with the turtle monitoring, researchers from Swansea and Cork headed out to sea by boat to catch different species of jellyfish, in the hope that we can improve our shaky knowledge of these creatures. In simple terms, we stand little chance of understanding the behaviour of leatherbacks without a grasp of the seasonality, distribution and abundance of their prey. For example, try understanding the behaviour of a lion without first understanding the habits and movements of the wildebeest it feeds upon. We were particularly

intrigued as to how leatherbacks reach such immense sizes feeding on an animal that is composed of 99% water! To address this, research is underway in Swansea to find out exactly how much energy there is in a jellyfish. When we know how many jellyfish a turtle needs to feed on in a week or a month, we will be better able to understand the requirements of turtles that feed around our coasts.

So to bring it all together, Atlantic leatherback turtles breed every two to three years at locations throughout the tropics. Following the breeding season the majority of animals head for the nutrient rich waters of the northern Atlantic, including the Irish Sea, to feed upon jellyfish. Turtles feed off our shores during the warm summer months and head down to winter at intermediate latitudes until the water temperature rises again next summer. They are often found in close association with large jellyfish blooms, so if you come across these when out at sea, keep your eyes peeled as you might just catch a glimpse of one of the most spectacular migrants to visit our not too cold seas.

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Web 2: http://www.turtle.ie

Can you help?

Interested groups or individuals can help record the stranding of jellyfish along the coast of Wales and eastern Ireland to build up a picture of the seasonality and distribution of these poorly understood animals. It's easy to do and we can supply you with all the information you need. The program has been running for two years to date and has one more year to run. If you are interested please visit Web 2 above or contact Dr Jonathan Houghton.

This project has received support from: University of Wales, Swansea; University College Cork; Natural Environment Research Council; INTERREG IIIA; Marine Conservation Society; Countryside Council for Wales; Ocean Spirits Incorporated, Grenada, West Indies; Grenadian Ministry of Agriculture, Forestry, Lands and Fisheries.

Mass stranding of barrel jellyfish on Whitford sands, Gower.
Photo: INTERREG IIIA – Irish Sea Leatherback Turtle Project.

Cyfrinachau'r crwban crwydrol

Mae dosbarthiad eang gan y crwban môr cefn-lledr, y mwyaf o'r saith rhywogaeth o grwban môr. Yn rhanbarth yr Iwerydd, bydd yn dodwy wyau ar draethau'r Caribî a Gorllewin yr Affrig bob dwy i dair blynedd ac mae'r ymdrechion i warchod y creadur, yn hanesyddol, wedi canolbwyntio ar y lleoedd hyn. Ychydig sydd wedi bod yn hysbys am ymddygiad y crwbanod yn y môr, ond mae cryn ofid am eu dyfodol, yn enwedig gan eu bod yn cael eu lladd yn sgîl gweithgaredd pysgota.

Mae ymchwil wedi dangos eu bod yn gwasgaru'n bell i'r gogledd o'u tiroedd magu ond yn dychwelyd i ddŵr cynhesach yn y gaeaf. Mae patrwm eu plymio hefyd yn newid wrth symud o fôr tlodaidd y Caribî i'r môr Iwerydd gyda'i gyflenwad bwyd mwy cyfoethog.

Mae arolygon diweddar o'r awyr wedi galluogi ymchwilwyr yng Nghymru ac Iwerddon i weld y crwbanod a'r casgliadau o slefrod môr, eu hoff brae. Mae un rhywogaeth o slefren, sef *Rhizotoma octopus* yn hynod o niferus rhwng Ebrill a Thachwedd ym mae Caerfyrddin, Tremadog a Rosslare a dyma hefyd yr ardaloedd pennaf lle gwelwyd crwbanod môr yn y gorffennol. Mae gwaith ymchwil ar y gweill i geisio deall mwy am werth slefrod fel ffynhonnell o egni i'r crwban môr cefn-lledr a thrwy hyn i geisio deall mwy am batrwm symudiad ac ymddygiad y crwbanod ar hyd ein glannau.

Gardening with birds in mind

Ivy is an important source of food and shelter for our garden birds. Photo: Michael Hammett.

Wildlife gardening is a term which has become ever more popular in the last 30 years, but how useful is it for bird conservation? **Becky Groves** *reviews the success of wildlife gardening for birds in Wales, and suggests ways in which everybody with a garden can contribute.*

Photo: Becky Groves.

Over the past 50 years the Welsh countryside, like much of the UK, has become a more hostile environment for birds. Population monitoring by organisations such as the British Trust for Ornithology (BTO) has shown that the worsening state of the countryside has affected bird species that were previously thought of as common. Many of these species are now in decline and are on the BTO's red list (eg. song thrush, bullfinch and spotted flycatcher) or the amber list (mistle thrush, goldcrest and dunnock). These are birds which are – or were – often seen in our domestic gardens, which poses the question: can gardeners contribute towards their conservation?

Reliable local information

While there is much literature available suggesting how to encourage birds to visit your garden, many of these recommendations are not based on a scientific analysis of how, or if, birds use 'wildlife friendly' features.

However, one such study has been carried out in Snowdonia at Plas Tan y Bwlch gardens. As already reported in *Natur Cymru* (No. 11, pp10-13: see also No. 10, pp28-31), a number of different management practices were introduced to try and encourage wildlife. Head Gardener Chris Hall and his colleagues decided to study eight species of bird and monitor their presence in the garden. Between 1994 and 2003, weekly surveys plotted the location of every individual seen there. A habitat survey took into account any features which may have changed over this time, and the results have been analysed to find out if the birds have responded to the different management.

The birds clearly had preferences for certain foods and habitats. These often corresponded with the accepted recommendations for wildlife gardening, although this was not always the case. Every garden is different, and variables such as altitude, climate and location must be taken into consideration. However, these results begin to help us to understand which wildlife gardening techniques appear to be most effective for birds, and indicate measures we can all take in our own gardens to encourage them.

Photo: Becky Groves.

What's on your menu?

The management techniques at Plas Tan y Bwlch were based on the principle that wildlife needs three main things: food, water and shelter. Many people in Wales and across the UK feed the birds in their gardens with supplementary food, usually peanuts and seeds. But birds, like humans, have different preferences. Blue, great and coal tits seem to like traditional peanuts and wild bird seed and have no problem hanging around on feeders. Finches also seem quite confident with feeders (provided they do not have squirrel proof cages on them) and have been shown to prefer the different seed types available, such as niger seed. Dunnocks, however, will not attempt to perch on a feeder, but will go for seed on the ground. Robins are also happier to bob about on the ground and, although they will eat seeds, they prefer crumbs and scraps. Thrush species such as blackbirds and song thrushes appreciate an old apple on the lawn from time to time.

Food for free

In the gardens at Plas Tan y Bwlch, 64 different species of bird have been recorded over the past nine years, yet virtually no supplementary feeding has taken place. Instead the birds (and other wildlife) are catered for through careful consideration of additions to the garden habitat. Just about every bird species found here ate invertebrates at some time during the year, and this will be true of most gardens. Plas Tan y Bwlch has adopted a number of policies to encourage invertebrates:

- Not using pesticides
- Actively encouraging native tree and flowering plant species
- Creating log piles and leaving dead wood in place
- Managing areas of long grass as meadows

As well as areas like wildflower meadows, the more formal area of the garden has a large expanse of mown lawn. Although a garden with only mown lawn is not deemed good for wildlife, due to the limited number of invertebrates, seeds and fruit it produces, some mown lawn can be beneficial, allowing birds like blackbirds and song thrushes to forage more successfully for worms. The Plas Tan y Bwlch study showed that survey squares with mown lawn recorded twice the number of song thrushes than those without.

Many birds, such as goldfinches and greenfinches, naturally feed on plant seeds. Buddleias, teasels, globe artichokes, and globe thistles are heavy seed producers and have been grown at Plas Tan y Bwlch, and many wasteland species, eg. knapweed, thistles and dandelion, are tolerated to benefit the birds. The study found that where these plants were present they attracted over thirteen times more goldfinches than where they were not present. This helps to confirm that it is worth finding a little room for such plants in our own gardens. Other birds are fruit feeders. At Plas Tan y Bwlch the birds can choose from a wide variety of fruit bearing plants, from native species like rowan, ivy and holly to species of Sorbus, Cotoneaster, Berberis, Griselinia, and Davidia, and fruit trees such as pears, medlars, cherries and different apple varieties.

The availability of these different fruit sources turned out to be very important and was shown to influence the use of the garden by bullfinches (a red listed species). Jays showed a preference for cherry trees, while mistle thrushes (amber listed species) preferred holly berries. It is important to have this variety because in years when one fruit crop fails it is more likely that another will be flourishing, ensuring a constant food

supply. In domestic gardens a mixture of mown lawn and wildflower meadow, fruit and seed rich plants, will create this variety of free food for our garden birds.

A bed for the night

Shelter is an important consideration. The most obvious kind is the provision of nest boxes, which are needed in habitats where there is a lack of natural nest sites like hollows in trees. They are successfully used in many gardens to raise young, but sometimes, unfortunately, they are either not used at all or the young do not make it to fledging. Some possible reasons for this are:

- the box is in direct sunlight so the box temperature gets too high.
- the box faces directly into the prevailing wind and rain, so it is too cold and wet.
- the box is too near a feeding station, which means parent birds have to defend their territory every two minutes.

Again, different birds have different requirements: tit species prefer the traditional, round-holed type while robins go for open fronted boxes, and house sparrows like to nest in colonies (see *Natur Cymru* No. 5, p27). Providing a variety of boxes may attract new species, but Plas Tan y Bwlch also tries to increase the number of natural nesting sites. Some of the ways of doing this can be applied in a domestic garden whatever its size. For example:

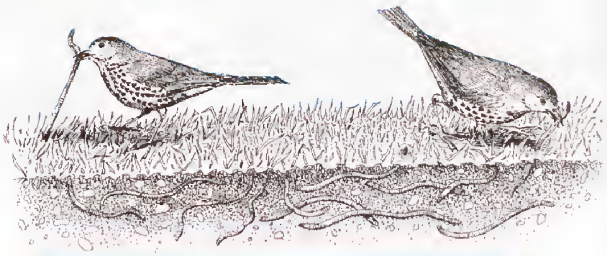
- Where possible, leave and encourage areas of bramble scrub, as this provides great habitat for species such as black cap and garden warbler.
- Promote the growth of climbers like honeysuckle and ivy on walls and fences: many birds favour cover created off the ground.
- Avoid disturbing favoured areas for nesting (hedges, trees and shrubs, climbers up walls and trees) in the nesting season.
- Tolerate old and veteran trees with natural hollows.

Making our efforts count

Gardens make up 3% of the total land area of England and Wales, often providing better conditions for birds than the surrounding countryside. They offer food, drinking water – in bird baths and carefully constructed garden ponds – and shelter, and so have huge potential for bird conservation. Wildlife gardening recommendations need to be backed up by scientific evidence to ensure that they are actually beneficial. Further studies of this kind in other gardens will give more indication of the most effective wildlife gardening methods for different bird species. The evidence from Plas Tan y Bwlch suggests that the reason their gardens have been successful in supporting so many bird species is due to the variety of habitats and added features the garden has within it. The gardens have been transformed into a kind of 'bird hotel', catering for many bird species, with a range of beds available and a menu of seeds, bugs and berries to suit all. Can your garden provide this?

Becky Groves is the Biodiversity Officer for Conwy County Borough and has completed a Masters thesis in Wildlife Gardening.

You can learn more at www.biodiversitywales.org.uk/resources/wildlifegardening



Adar Tanybwlch – cofnodi cyn cynghori

Er bod digon o gyngor i gael ynglŷn â denu adar gwyllt i'r ardd, ychydig ohono sy'n seiliedig ar dystiolaeth wyddonol. Mae'r gwaith monitro a gynhaliwyd yng Ngerddi Plas Tanybwlch rhwng 1994 a 2003 yn enghraifft o'r math o astudiaeth sy'n bwysig er mwyn deall mwy am wir anghenion adar gwyllt mewn gerddi. Cyflwynwyd gwahanol ddulliau rheolaeth i'r gerddi er mwyn creu amrywiaeth o fwyd a gwahanol fathau o loches i adar. Dangosodd yr astudiaeth ei bod hi'n bwysig cael amrywiaeth o goed ffrwyth er mwyn sicrhau cyflenwad o fwyd bob blwyddyn. Gwelwyd hefyd bod darnau bach o lawnt fer yn werthfawr i adar fel mwyeilch, sy'n tyrchu am fwydod, a bod planhigion sy'n cynhyrchu llawer o hadau yn bwysig. Sylweddolwyd ei bod yn werth chweil creu cynefinoedd naturiol ar gyfer creaduriaid di-asgwrn-cefn gan fod yr adar i gyd yn bwyta'r rhain ar ryw adeg. Dangoswyd nad oedd angen rhoi bwyd ychwanegol os oedd gardd yn cynnig amrywiaeth da o gynefinoedd a ffynonellau naturiol o fwyd. Gwelwyd hefyd ei bod hi'n werthfawr cynnig cynefinoedd nythu naturiol.

Y Grug a'r Caerau

Bryngaer Moel Arthur/Moel Arthur hillfort. Ffoto: Hawlfraint y Goron/CBHC/Crown Copyright: RCAHMW.

Mae bryniau Sir Ddinbych yn ganolbwynt i ddatblygiad cynhyrfus sy'n anelu at warchod a gwella cyflwr y rhostir a'r safleoedd hanesyddol sy'n creu cymeriad arbennig yr ardaloedd hyn. ***Helen Mrowiec****, swyddog prosiect 'Y Grug a'r Caerau' sy'n egluro'r cefndir i'r gwaith a'r amcanion ar gyfer y dyfodol.*

Ystyrir gweundir grug yn gynefin arbennig, sydd yn nodweddiadol yn cynnwys clytwaith o blanhigion grug a llus – ac eithin hefyd, ambell dro. Mae'n gartref i adar cymharol brin megis y rugiar ddu, y rugiar goch, y cudyll bach a mwyalchen y mynydd. Hawdd yw meddwl, oherwydd bod Cymru yn gymharol gyfoethog o ran ei gweundiroedd grug, bod hwn yn gynefin lled gyffredin, ond o ystyried bod ynysoedd Prydain yn cynnal 75% o'r holl weundir sy'n weddill drwy'r byd i gyd, mae'n gynefin y dylem ymfalchïo ynddo, gan roi gofal a sylw arbennig iddo er mwyn sicrhau ein bod yn ei ddiogelu ar gyfer y dyfodol.

Teg yw dweud na chafodd ein gweundiroedd y gofal gorau yn y gorffennol. Golyga cyn-bolisïau'r llywodraeth fod dros 50% o ardaloedd gweundir Cymru wedi cael eu colli dros yr hanner can mlynedd diwethaf, yn bennaf o ganlyniad i wella tir yn amaethyddol a chynlluniau coedwigaeth. Mae rhannau sylweddol o'r gweundir sydd ar ôl mewn cyflwr anffafriol oherwydd diffyg rheolaeth. Yr ymwybyddiaeth gynyddol o bwysigrwydd y gweundiroedd yng ngogledd ddwyrain Cymru, ynghyd â'r sylweddoliad bod angen cydlynu eu rheolaeth yn well, roddodd y sbardun i nifer o asiantaethau, mudiadau ac unigolion ddod at ei gilydd i greu partneriaeth y Grug a'r Caerau. Bydd y prosiect yn canolbwyntio ar ardaloedd Bryniau Clwyd a Mynydd Llantysilio.

Nid y planhigion a'r bywyd gwyllt yn unig sydd yn gwneud ucheldir yr ardal hon yn nodedig; mae hefyd yn dirwedd o bwysigrwydd hanesyddol neilltuol. Coronir nifer o'r bryniau gan fryngaerau sydd yn dyddio nôl i Oes yr Haearn, oddeutu 2,500 mlynedd yn ôl. Manteisiodd

cymunedau'r gorffennol ar dirwedd naturiol yr ardal gan ddefnyddio llethrau'r bryniau fel rhan o amddiffynfeydd eu aneddiadau. Mae'r gadwyn o fryngaerau yn dominyddu tirlun Bryniau Clwyd hyd heddiw, ond ychydig iawn a wyddom amdanynt a'u trigolion oherwydd diffyg gwaith ymchwil diweddar.

Mae'r dirwedd naturiol, y planhigion a'r bywyd gwyllt, ynghyd â hoel troed y gorffennol yn cyfuno i wneud Bryniau Clwyd a Mynydd Llantysilio yn ardal hynod o arbennig, sydd yn cael ei gwerthfawrogi gan bobl leol ac ymwelwyr fel ei gilydd. Disgrifia Ceiriog yn ei gerdd, Nant y Mynydd, y berthynas glòs y mae cynifer yn ei deimlo tuag at weundiroedd grug yr ucheldir…

Mab y Mynydd ydwyf innau,
Oddi cartref yn gwneud cân,
Ond mae 'nghalon yn y mynydd,
Efo'r grug a'r adar mân.

Gwaith adfer llwybrau, Moel Famau/Footpath restoration work, Moel Famau. Ffoto: Carl Rogers.

Cynllun Tirlun

Yn draddodiadol mae rheolaeth llystyfiant ein cynefinoedd yn digwydd yn annibynnol ar reolaeth diddordebau eraill, megis safleoedd hanesyddol neu ddiddordebau hamdden. Rhoddir ystyriaeth i'r ffactorau hyn wrth ddatblygu cynlluniau, ond nid yw rhaglenni integredig yn cael eu datblygu o'r cychwyn. Rheoli treftadaeth y tirlun yn ei gyfanrwydd yw nod prosiect y Grug a'r Caerau. Y gobaith yw datblygu cynlluniau a fydd yn integreiddio rheolaeth treftadaeth naturiol a hanesyddol ym Mryniau Clwyd a Mynydd Llantysilio ynghyd â gwella ein dealltwriaeth o'r tirlun hanesyddol a chynyddu diddordeb ac ymwybyddiaeth pobl o bwysigrwydd yr ucheldir hwn.

Mae gwaith cynllunio wedi dechrau ar gyfer Prosiect y Grug a'r Caerau, yn dilyn grant cynllunio a sicrhawyd gan Gronfa Dreftadaeth y Loteri, gyda chyfraniad o arian cyfatebol gan Gyngor Sir Ddinbych a Chadwyn Clwyd. Bydd cais llawn yn cael ei gyflwyno i Gronfa Dreftadaeth y Loteri, ac i arianwyr posib eraill, ym mis Mawrth eleni, yn y gobaith o sicrhau nawdd ar gyfer y prosiect llawn.

Rheolaeth Integredig

Er bod prosiect y Grug a'r Caerau ar hyn o bryd mewn 'cyfnod cynllunio', mae'r potensial ar gyfer y weledigaeth o reolaeth integredig wedi cael ei brofi yn barod. Yn 2003 llosgwyd ardal o weundir yn anfwriadol ar ran o un o fryngaerau Oes yr Haearn mwyaf Prydain, sef Penycloddiau, ger Llangwyrfon. Dadorchuddiodd y tân batrymau manwl ar wyneb y tir a oedd cynt wedi bod ynghudd o dan y llystyfiant. Comisiynwyd Ymddiriedolaeth Archeolegol Clwyd-Powys, o dan nawdd CADW, i wneud arolwg o ffurf y tir. Darganfuwyd 43 o safleoedd tai posibl, yn dyddio nôl i'r Oes Haearn, nad oeddynt wedi cael eu cofnodi o'r blaen, a hynny ar draean o'r safle yn unig. Mae'r arolwg wedi dangos cyn lleied y gwyddom am y safleoedd hyn, yn ogystal â dangos y potensial i gyfuno dulliau rheolaeth grug traddodiadol gydag ymchwil archeolegol. Drwy gyfuno y ddwy strategaeth reolaeth gellir rheoli'r cynefin ar gyfer bywyd gwyllt ac amaeth, tra'n sicrhau nad yw'r rheolaeth yn difrodi ein hetifeddiaeth archeolegol – a hefyd darparu cyfle ar yr un pryd i ymchwilio, darganfod a chofnodi cyfrinachau y safleoedd hyn. Ers yr arolwg a wnaed ym Mhenycloddiau, mae arolwg pellach o gyflwr y chwe bryngaer sydd o fewn ffiniau'r prosiect wedi cofnodi safleoedd posib mwy na 60 o gytiau crwn ychwanegol.

Pwysigrwydd Cynnal Amaeth

Mae sicrhau parhad defnydd amaethyddol o'r gweundiroedd yn ardal Bryniau Clwyd a Mynydd Llantysilio yn allweddol i gynnal a chadw diddordeb cadwraethol yr ardal. Gobaith y prosiect yw dangos y cynnydd yn ansawdd a gwerth y porthiant sydd yn gysylltiedig gyda gweundir sy'n cael ei reoli yn dda. Nod y prosiect yw cydweithio gydag eraill er mwyn

Tŵr y Jiwbili, Moel Famau/Jubilee Tower, Moel Famau.
Ffoto: Carl Rogers.

ceisio datblygu clytwaith o weundir grug o wahanol oedran ar gylch rheolaeth o 15 i 20 mlynedd a fyddai'n fanteisiol i amaeth a chadwraeth. Yn ogystal, gobeithir cynyddu'r arwynebedd o weundir grug yn yr ardal drwy reoli ymlediad rhedyn yn yr ardaloedd hynny ble mae grug neu lus yn dal i fod yn bresennol yn yr is-dyfiant.

Mae rheolaeth amaethyddol yn enghraifft bellach o'r angen am gynllun ar y cyd er mwyn sicrhau budd i fywyd gwyllt a gwarchod safleoedd hanesyddol. Nid yn unig gall lefel stocio amhriodol gael effaith andwyol ar ansawdd y gweundir, ond gall hefyd arwain at ddifrodi'r tomenni amddiffynnol sy'n ffinio'r bryngaerau, gan fod defaid yn rhwbio yn erbyn y rhain er mwyn ceisio cael lloches. Felly byddai sicrhau cytundeb ar gyfer dwysedd stoc priodol yn fanteisiol i'r bywyd gwyllt ac i'r diddordeb hanesyddol fel ei gilydd ar y safle.

Er mwyn llwyddo gwella ansawdd y gweundir grug ar Fryniau Clwyd a Mynydd Llantysilio bydd yn rhaid dod â diddordebau tirfeddianwyr, porwyr ac asiantaethau ynghyd. Mae gwaith arbennig yn cael ei wneud yn barod mewn rhannau o'r ardaloedd hyn o ganlyniad i ymdrechion y porwyr, tirfeddianwyr, Cyngor Cefn Gwlad Cymru a'r Gymdeithas Frenhinol er Gwarchod Adar, mudiadau sydd yn bartneriaid ym Mhrosiect y Grug a'r Caerau. Y gobaith yw ymledu, cydlynu a chyfrannu adnoddau pellach tuag at y gwaith da sydd yn digwydd eisoes.

Mae cymorth ariannol ar gael ar gyfer cyflawni gwaith sy'n gwella ansawdd cynefinoedd, fel gweundir, ar gyfer bywyd gwyllt – un ai drwy gynlluniau amaeth amgylcheddol neu drwy gytundeb rheoli os yw'r ardal wedi cael ei dynodi. Fodd bynnag, mae sicrhau buddsoddiad o'r fath ar gyfer ardal o dir comin yn fater cymhleth gan fod cynifer â rhyw fath o ddiddordeb yn y tir. Gobaith y prosiect yw rhoi cymorth pa le bynnag y mae ei angen, er mwyn helpu'r ardaloedd hyn i dderbyn y cymorth haeddiannol ar gyfer gwaith cadwraethol.

Pen y Cleddau.
Ffoto: Hawlfraint y Goron: CBHC/ Crown Copyright: RCAHMW.

Moel Famau.
Ffoto: Carl Rogers.

Datrys Problemau

Pryder sydd yn cael ei rannu gan y porwyr, y cadwraethwyr a'r archeolegwyr yw'r difrod sy'n digwydd o ganlyniad i'r defnydd a wneir o Fynydd Llantysilio, yn fwyaf arbennig, gan 'fynyddwyr ar feiciau modur', fel y disgrifiwyd hwy gan y naturiaethwr a'r ysgrifennwr, William Condry. Mae'r defnydd anghyfreithlon o'r mynydd gan gerbydau yn erydu llystyfiant bregus y gweundir ac yn achosi difrod ar safleoedd hanesyddol, yn enwedig bryngaer Moel y Gaer. Mae'n anodd rhwystro defnydd o'r mynydd gan gerbydau oherwydd natur agored yr ardal. Fodd bynnag, gobaith y prosiect yw sefydlu cynllun addysgiadol er mwyn cynyddu ymwybyddiaeth o bwysigrwydd yr ardal, yn ogystal â sicrhau fod unigolion yn ymwybodol o bwy y dylid cysylltu â hwy i adrodd am droseddau. Yr unig ateb tymor hir i'r broblem hon yw darganfod safle cyfreithiol y gall y beiciau modur ei ddefnyddio.

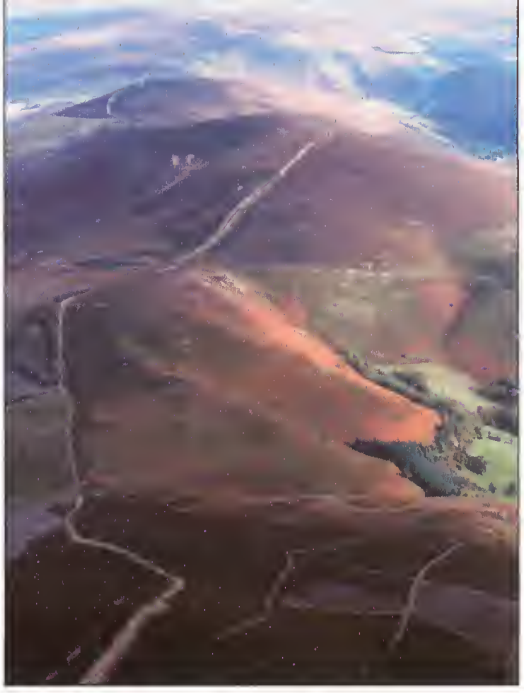
Gweithio Gyda'r Gymuned

Mae gweithio gyda'r gymuned wrth wraidd y weledigaeth ar gyfer prosiect y Grug a'r Caerau. Mae'n amlwg, o'r gwaith ymchwil sydd wedi cael ei ddatblygu gan y prosiect, bod etifeddiaeth yr ucheldir yn hynod o bwysig i'r gymuned leol a'i bod yn frwd i ddarganfod mwy am ei hanes. Gobaith y cynllun yw darparu cyfleoedd i bobl o bob cefndir i ymwneud â phrosiectau i reoli ac arolygu'r gweundir ac i gymryd rhan mewn gwaith ymchwil archeolegol, yn ogystal â darparu cyfleoedd i fwynhau treftadaeth yr ardal drwy raglen o ddigwyddiadau. Bydd adnoddau ar gyfer hyrwyddo defnydd addysgol o'r asedau treftadaeth lleol hefyd yn cael eu datblygu.

Prosiect y Grug a'r Caerau

Mae nifer helaeth o gyrff statudol, mudiadau gwirfoddol ac unigolion yn gweithio'n galed i geisio sicrhau llwyddiant y prosiect uchelgeisiol hwn er budd treftadaeth yr ucheldir. Os yw'n llwyddiannus, prosiect y grug a'r caerau fydd un o'r Cynlluniau Partneriaeth Tirlun cyntaf i gael eu sefydlu yng Nghymru.

Am wybodaeth bellach cysylltwch â **Helen Mrowiec**, Swyddog Prosiect y Grug a'r Caerau 01824 708257.



Ffoto: Hawlfraint y Goron: CBHC/Crown Copyright: RCAHMW.

Bryngaer Moel y Gaer, Mynydd Llantysilio yn dangos y problem erydiad/Erosion problems on Moel y Gaer.

Heather and hillforts

Denbighshire's 'Heather and Hillforts Project' was created as a result of the growing awareness of the historical and ecological significance of the remaining fragments of heather moorland in this north-east corner of Wales, and of the need for improved coordination of their management. This landscape scale project aims to integrate, from the outset, the conservation and restoration of the heather moorlands and Iron Age Hillforts of the Clwydian Range and Llantysilio mountain along with work to encourage greater understanding and enjoyment of these uplands amongst residents and visitors. The current 'development phase' of the project, part funded by HLF, has been critical in order to carry out the archaeological, ecological and community research required to inform the development of the full grant application. This will be submitted in March 2005 and if successful, the Heather and Hillforts Project will be one of the first Landscape Partnership Schemes to be supported by the Heritage Lottery Fund in Wales.
Further details: **Helen Mrowiec**, Heather and Hillforts Project Officer, 01824 708257.

Rivers of life – *river restoration in the upper Severn and upper Vyrnwy catchments*

Pwll Penarth. Photo: Montgomery Wildlife Trust.

A great river like the Severn starts out as a myriad of small streams and feeder rivers, which can be vulnerable to problems connected with land management such as acidity, siltation or pollution. Tackling these issues, which may have many and complex causes, calls for cooperative solutions, as ***Mags Cousins*** *describes.*

The quality of the water flowing through the fine network of tributaries which feed our rivers is at the heart of a healthy environment. If it is full of oxygen and free of pollution, it will be life giving, like the blood which flows through our veins. But water that is too acid, or is loaded with waste, can kill aquatic life. The huge upland areas which form the catchments of the upper Severn and upper Vyrnwy, with their high rainfall and hard rocks, are vulnerable to the acidifying effects of atmospheric pollution and changes in land use.

To counter this effect, and to improve water quality, fish stocks and wetland habitats, a group of organisations has joined forces to form the Severn Natural Assets Project, known as SNAP. The idea is to improve wetland habitats and at the same time support rural tourism, especially angling, bird-watching and walking, thereby boosting the local economy.

Salmon parr. Photo: Environment Agency.

Severn Natural Assets Project – who are we?

The Environment Agency has teamed up with Forestry Commission Wales, Montgomeryshire Wildlife Trust, Powys County Council, Severn Trent Water Ltd., FWAG Cymru, the Countryside Council for Wales and Llanidloes and District Angling Association to reduce pollution, provide more wildlife-rich habitats, and create pleasant forests to visit and more fish in the rivers.

Sustainable forests tackle acidification

The upper reaches of the Severn, within the Forestry Commission's Hafren Forest, used to suffer from peaks in acidity after heavy rain and this was killing the fish. The babbling streams looked beautiful but were devoid

of life. The conifers do not cause the acidity but the acid rain flows quickly off the land through old drainage ditches which criss-cross the area, pouring straight into the Severn feeder streams with no chance of the acidity being neutralised by semi-natural vegetation.

As a short term solution the Environment Agency installed two liming machines, called lime dosers, in Hafren Forest. When the acidity goes up, the dosers automatically deliver lime to the water to neutralise it. This protects the fish from dangerous peaks in acidity. As a long term solution Forestry Commission Wales is recreating natural vegetation and marshy areas along river corridors throughout the forest. Many conifers have already been felled and heather, bilberry and spaghnum mosses are re-establishing. In places dense stands of spruce are naturally regenerating; as this could undermine our success in reversing acidification, the project is paying for specialised machinery to flail this re-growth. Working together, Forestry Commission Wales and the Environment Agency are creating ponds and blocking drainage ditches to recreate marshy areas.

The work in Hafren Forest has multiple benefits. Conifer removal will improve the forest for visitors, increase the biodiversity of river corridors and improve water quality by reducing acidification. It should also increase the long-term economic viability of the local area. An estimated 20,000 people visit Hafren Forest each year, attracted by its varied and beautiful environment and opportunities for active enjoyment. Popular access paths through the forest are linked to the Severn Way Long Distance Trail, which follows the river for 210 miles from 'the source to the sea'. Powys County, Forestry Commission Wales and Severn Trent Water are promoting the 55 miles of the trail that are within Powys.

Wildlife and wetlands

The Environment Agency, together with the Montgomeryshire Wildlife Trust, are restoring and recreating wetlands in the Severn valley. Among new reserves which have been created is Dolydd Hafren, where scrapes, pools and wet grassland attract waders and wildfowl in large numbers. Hides and screened walkways enable visitors to get close to the wild birds without disturbing them. At Llandinam Gravels, a wildflower meadow has been re-created by spreading hay from a species-rich grassland, and hundreds of black poplar cuttings have been planted. For Montgomeryshire Wildlife Trust this is an opportunity to reconnect people with wildlife through public access and community involvement.

Dolydd Hafren.

Photos: Environment Agency.

Fry at Clywedog hatchery.

Photos: Environment Agency.

Agricultural diffuse pollution

Tackling water quality would not be complete without addressing diffuse pollution, the continual background pollution which comes from many sources. In these upland areas the most likely cause is agriculture, perhaps from too many stock trampling river banks. The Afon Cain is a designated salmon and trout fishery and is situated to the north-west of Welshpool flowing past the villages of Llanfyllin and Llanfechain. It joins the Afon Vyrnwy upstream of the Afon Tanat. In 2003 most of the river showed a deterioration in water quality. This is thought to have been caused by diffuse agricultural pollution and increased siltation in the river. This led to a decline in the population of juvenile salmon and trout and an increase in brook lamprey, a fish which prefers silty water. For hatching success, salmon and trout eggs rely on a good flow of oxygenated water through the gravel on a riverbed.

Soil can be washed off land and into a river, smothering gravels and suffocating the eggs and newly hatched juveniles. The Afon Cain Diffuse Pollution initiative was set up by SNAP to tackle this problem. The Environment Agency, in partnership with the Farming and Wildlife Advisory Group Wales (FWAG Cymru) are working with farmers to promote farming best practices and encourage simple measures to protect the rivers. Farmers are encouraged to fence watercourses to prevent livestock from trampling river banks; to leave a buffer strip of land beside watercourses; and to prevent sheep dip chemicals entering the watercourses and contaminating them.

Farmers throughout the catchment are interested in the initiative, and the guidance from FWAG Cymru will help improve farms through effective nutrient and waste management.

Return of the wild salmon and trout

Improving water quality alone is not enough to restore salmon and trout to their former breeding gravels in the upper Severn and Vyrnwy catchments. There are many obstructions in the rivers, which the fish cannot negotiate. SNAP does not have the funds to build fish passes, which can be very expensive, but will work with owners and occupiers to find opportunities for removing obstructions.

SNAP is directly boosting wild salmon stocks by hatching eggs from wild-caught salmon and releasing fry back to the streams that the parent fish came from. The Environment Agency and Severn Trent Water are hatching up to 350,000 salmon eggs each year at Clywedog hatchery. Eggs are stripped from wild salmon and are hatched in purpose built tanks. Some of the fry are micro-tagged before being released so that they can be identified when they return as adults.

Near the hatchery at Clywedog reservoir the water quality and fishing has improved so much that Llanidloes and District Angling Association are now able to hold international competitions. The economic value of salmon to the local economy is estimated to be £8,000 per rod-caught fish, so the fishing clubs and the local community generally should benefit economically.

This is another aspect of SNAP's work which, while improving water quality and fish stocks in the upper Severn and Vyrnwy catchments, also promotes sustainable rural economic development. In order to tackle complex issues, partners from across the upper Severn and upper Vyrnwy have joined SNAP, and are working together with the local community to revive our rivers and improve our natural environment. The partner organisations would like to acknowledge the support of the East Wales Objective 2 and Transitional Programme of the European Regional Development Fund administered by the Welsh European Funding Office (part of the Welsh Assembly Government). This programme provided £107,839 for Phase 1 of SNAP and Phase 2 is currently underway with further grant aid of £331,645.

Mags Cousins is External Relations Officer for the Environment Agency, Upper Severn Area. For further information on this project contact her at: Environment Agency, Hafren House, Shrewsbury 01743 283580
email mags.cousins@environment-agency.gov.uk

Achub Afonydd y Canolbarth

Mae prosiect SNAP yn ceisio sicrhau ansawdd dŵr da, poblogaethau iach o bysgod a chynefinoedd cyfoethog ar hyd afonydd Hafren ac Efyrnwy. Yn rhannau uchaf dyffryn Hafren mae corstiroedd yn cael eu hadfer, coed coniffer yn cael eu clirio a chalch yn cael ei ollwng i'r dŵr o bryd i'w gilydd er mwyn gwarchod y pysgod rhag asidedd uchel. Crëwyd sawl gwarchodfa ar hyd dyffryn Hafren, sy'n rhoi cyfle i bobl ddod i gysylltiad agos gyda bywyd gwyllt cin gwlyptiroedd. Yn nalgylch yr Afon Cain, lle'r oedd llawer o lygredd amaethyddol yn cyrraedd y dŵr o ffynonellau gwasgaredig, anogir ffermwyr i arfer rheolaeth dda, i wared rhwystrau sy'n atal pysgod rhag symud ar hyd yr afon ac i ymgymryd â gwaith syml, fel ffensio, er mwyn gwarchod yr afonydd a gwella'r cynefin ar gyfer eog a brithyll. Gollyngir eog gwyllt yn ôl i'r afonydd o ddeorfa Clywedog. Ger y ddeorfa mae ansawdd y dŵr a'r pysgota cystal fel bod cystadlaethau rhyngwladol bellach yn cael eu cynnal yno – cyfraniad arall gan y diwydiant pysgota i'r economi lleol.

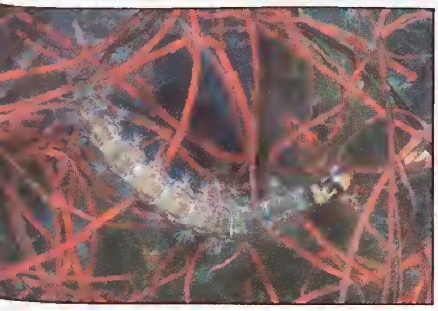
Cors Dyfi.

Photo: Environment Agency.

A story of river flies

Stonefly Nemoura avicularis, *adult male.* *All photos: Michael Hammett.*

What could be better than sitting beside a beautiful, fast-flowing river on a still, warm summer's day, watching trout rise to a swarm of insects of a species which is almost unchanged since before the age of the dinosaurs? There is a lot to learn about the fascinating lives of those living fossils, the river flies. ***Michael Hammett*** *fills in the details.*



Caddisfly Rhyacophila dorsalis, *larva.*

Imagine a journey back into the mists of time, long before fishes and other vertebrates existed, until the only winged insects are cockroaches, grasshoppers and mantids crawling over the face of the earth. Then you will have reached the time when the earliest of the river flies first appeared on our planet. This is the period when the earth was covered in forests of giant horsetails and tree ferns.

In this article I am going to talk about three of the most primitive orders of insects which still exist today. These are the dragonflies and damselflies (*Odonata*), mayflies (*Ephemeroptera*) and stoneflies (*Plecoptera*). I am also going to discuss caddisflies (*Trichoptera*), which arrived much later on the scene. All of these orders have aquatic larvae but their adults are able to survive on land. There are a wide range of other aquatic insects including black flies, crane flies, biting flies and water beetles which I will not be able to discuss on this occasion.

For those of you who would like some facts and figures, cockroaches and associated groups evolved during the Carboniferous period between 363 and 290 million years ago, along with the dragonflies. The ancestors of stoneflies, the '*Paraplecoptera*', also evolved during this period. The earliest forms of our mayflies followed during the Lower Permian period between 290 and 270 million years ago. By the end of the Permian period, some 245 million years ago, these primitive orders had evolved into species which we could recognise today. The primitive species of caddisflies were once linked with *lepidoptera* in the grand order *Amphiesmenoptera* which first appeared during the Triassic period some 225 million years ago. However, our moths and butterflies broke away from the true caddisflies during the Jurassic period some 200 million years ago, and evolved to become mainly terrestrial insects.

March Brown mayfly **Rithrogena germanica** *female dun.*

All of these creatures have survived periods of intense volcanic activity, continental drift, several ice ages and the extinction of the dinosaurs, not to mention periods of extreme drought and global warming. Despite their ancient origins, some species are still evolving, although most of their changes can be regarded as fine-tuning.

Rivers of life

Much poetry has been written about our rivers and most people have been drawn to them at some time during their lives. They provide both beauty and tranquillity but very few people understand their ecology and life-giving properties within our countryside. All rivers are formed within a catchment and at their source there are headstreams. These may be very numerous and, in Wales, they frequently flow into upland lakes or reservoirs. Out of these flow the headwaters of the river, which are fed by tributaries and more headstreams. Sometimes they flow in and out of lakes lower down the system. This expansion of the main river continues throughout its journey to the sea, and these veins and arteries of our countryside provide both water and nourishment to all the plants and animals therein.

No two rivers are the same, although they all have three distinct sections, consisting of upper reaches, middle reaches and lowland sections. The gradient and flow rate determine the nature of the habitat; for example a steep gradient with waterfalls and rapid flow rate usually creates a clean, stony bed, with areas of shallows on the inside of bends where stones and shingles are deposited.

The March Brown larva **Rithrogena germanica.**

Stonefly* Dinocras cephalotes *larva, known as a 'crawler'.

As the water runs over these it is forced to flow faster and air bubbles are created which produce riffles, thus increasing the oxygen content in the water. This property is very important to many of the river fly species. Most of the rivers in Wales are classified as spate rivers which are capable of returning to low water relatively quickly after heavy rainfall.

From their source they flow over hard rocks like granites, so the water is unable to dissolve any neutralising salts and is soft or slightly acidic in the upland areas.

Today water acidity is increased by acid rain, and it takes longer before this acidity is neutralised and waters become slightly alkaline due to enrichment from the surrounding land in the lowland sections. We therefore have a range of habitats which are present in the sections of each river system. Insect life in our rivers can take advantage of more than one habitat, through a process known as invertebrate drift.

Briefly, each species has its own life cycle and it starts with a gravid female adult laying its eggs at the top end of a section of river suitable to its needs. Young larvae hatch and feed up in this area until their food becomes diminished, when they drift downstream until they find a new feeding area and the whole process is repeated until they have reached maturity.

Welsh black-finned trout.

They then emerge as adults, mate and the gravid females fly upstream to lay their eggs, so the cycle is complete. This is only a general guide and there are several slightly different versions of it depending upon the species concerned.

Today most people have a good idea of the fishes and mammals that live in rivers but they have no idea of the creatures on which these animals feed. In a healthy river there are more invertebrates per square metre, measured in biomass, than occur on land, but knowledge of these creatures is limited to experts in the field.

River dragonflies

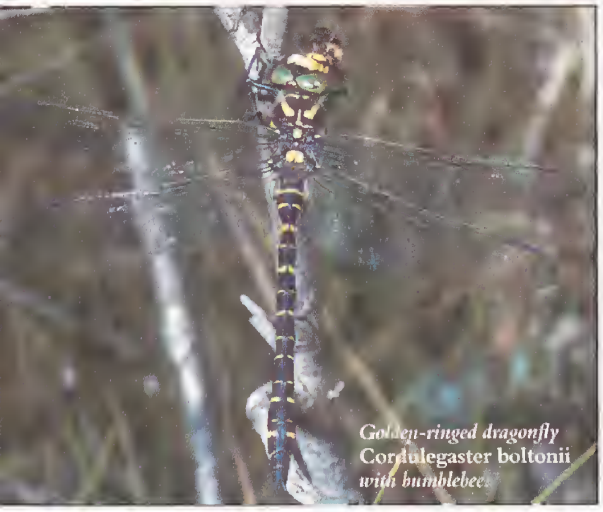
Strictly speaking, dragonflies and damselflies are not true river flies, as most of them prefer still or slow-flowing water. There are however a few that occur only in streams and rivers. The golden-ringed dragonfly is one of our largest and may be found in small streams and upland sections of rivers.

Here also, in stony streams, occurs the demoiselle damselfly. On the other hand, the club-tailed dragonfly is only found in slow moving stretches of lowland sections, along with the banded demoiselle damselfly and white-legged damselfly. The larvae in this family are ambush predators; they catch their prey with extendable jaws which can be operated within a microsecond to grab their victims. As they grow, larvae develop wing buds on their thorax, inside which highly compressed wing structures are formed. Dragonfly larvae will eat anything that moves, including small fishes.

Demoiselle damselfly **Calopteryx virgo.**

Adults retain those deadly mouthparts and catch their prey on the wing using their legs, which have interlocking, long, sharp spines on their inside edges. When freshly emerged they are usually a dull brown, and remain like this until they have eaten their first meal. In full colour they are very attractive insects and are a joy to watch as they patrol their territory. They can operate each wing independently, making them the most perfect flying insects on our planet.

Upland species: Afon Llugwy, near Betws-y-Coed, is a good upland habitat.



Golden-ringed dragonfly
Cordulegaster boltonii
with bumblebee

Mysterious mayflies

Mayflies or 'Upwing flies', frequently copied by fishermen seeking a trout supper, are a complex but little understood group. There are just over forty species in Britain, many of which are found in Wales. We have representatives of eight families in Britain and members of only one family live for one day, the *Caenidae*. These are affectionately referred to as 'the fisherman's curse' by anglers, as they hatch in their thousands and confuse the trout so much that they will not take a fisherman's fly.

Mayfly larvae feed almost exclusively on algae and fine, rotting, vegetable material. They have evolved into so many different shapes that some look like visitors from another planet. They may have aqua-dynamic shapes which allow them to crawl over rocks in waterfalls in order to feed on algae growing on the rocks, or be rocket-shaped to assist movement in weed growth; and there are the burrowers that look like the insect version of moles. They all have three tails and grow wing buds on their thorax which eventually contain fully developed but compressed wing structures. They also breathe through complex external gills.

Their skin is made of chitin and, unlike our more evolved insects, does not stretch as they grow. As a result they have to cast their skin up to seventeen times before they reach maturity. Now if that is not complicated enough, they have a unique life cycle. Things appear to be fairly normal until larvae reach maturity. Then they stop feeding and dash around erratically, frequently rising to the water surface. They do this in order to take in air, which is pumped in between their outer skin and the newly formed inner skin of the sub-adult or dun.

This gives them a silvery appearance and makes them more bouyant. It also makes them irresistible to all game fish. Finally, one of three things will happen. Some larvae rise to the surface and within seconds a fully winged dun emerges and takes flight. In other species the dun emerges underwater and takes flight the moment it breaks through the water surface. The remainder crawl out of the water before hatching. I am still amazed by the speed at which these insects can enlarge and stiffen their wings, as no other insect can do this. Usually larvae synchronise their time of hatching so that many may hatch within a period of half an hour. After only a short flight the dun will land in nearby vegetation close to the riverbank and rest quietly before the next change takes place. It will wait there, sometimes for several days, until the weather conditions are right. Duns may retain three tails or discard the middle one, depending upon the species in question. Different species will emerge at different times of day, although they all wait until the wind drops during a warm spell before continuing their life cycle.

At the right time the dun will cast its skin, including the outer wing membranes, and an adult or spinner will emerge, and take flight if the conditions remain suitable. No other insect can achieve this transformation. If conditions are not suitable it will sit quietly for several more days before it takes to the air. Male spinners fly to a pre-determined place and form into small or large swarms. Provided the air is still enough they will commence their well-documented dancing display flight and are joined by females who fly upwards into the swarm until they are captured by one of the males. He flies up underneath the female and clamps her to him using specially extended forelegs. He is able to carry out this manoeuvre with extreme accuracy, as his eyes are very large and cover the top and side of his head. The pair mate within the swarm and afterwards drop out and separate. The male falls to the ground and dies soon afterwards.

The gravid female flies back to the river and heads upstream where she deposits her eggs either onto the water surface or by crawling down vegetation until she is under the water. Her thousands of eggs are like spores until they come in contact with water, when they swell instantly to many times their original size and develop a sticky coating which attaches them to the nearest solid object. Having completed her egg laying, she either drops onto the water or releases her grip and drowns. Mayflies can be found in any natural water source from the highest mountain streams down to saline estuaries, and can emerge at any time of the year. They are unique amongst all insects and deserve our greatest respect and admiration.

Primitive stoneflies – grazers as well as predators

Stoneflies are equally primitive but have followed a more conventional evolutionary line. There are 34 species on the British list with representatives of seven families. Like dragonflies, they only go through partial metamorphosis and the adult is basically a copy of the larva with the addition of wings or not as the case may be.

Unlike mayflies, some are grazers and others are predators. Their larvae are not particularly streamlined but are much stronger and more ruggedly built and their bodies are heavily armoured with spines. Being primitive by design, they have retained three distinct parts to the thorax and only have two tails. Like the mayflies, they also grow wing buds but these develop on the second and third segments of the thorax. The predatory species are very mobile hunters and have particularly well developed jaws which lock onto their prey. They originate in upland streams and headwaters, having a need for highly oxygenated water during the early part of their development. They thrive in cold water and will enter periods of hibernation or diapause when water temperatures rise during the summer months. Like mayflies, they have to cast their skin regularly in order to grow.

Stonefly Yellow Sally Isoperla grammatica, *adult.*

Mayfly Potamanthus luteus, *male spinner.*

Grey wagtail hunting for prey.

Adults of the grazing species are diurnal and mating takes place during the daytime: the predatory species are mainly nocturnal animals although they do sometimes emerge during the day. They come in many forms: some have short-winged males, some are quite small, whilst others are referred to as 'needle flies'. These are very thin and have long wings that are rolled around their bodies.

When approaching maturity many of them drift downstream until they reach the main river. This may take one, two or three years to achieve. Their larvae always crawl out of the water before emerging. Most of the families emerge during the late winter and early spring, but a few species may be found during any month of the year.

Some of the predatory species produce the largest flies in Britain. All the fully winged species fold their hindwings under their forewings when at rest.

Most are a drab brown and are very reluctant to fly, even when approached, but can run very fast when attacked. The males make contact with females by drumming a hardened hammer-like projection on the underside of their abdomen against any solid surface. We cannot hear the sound they make but each species has its own call. Females of the predatory species also call in a similar fashion.

Mayfly larva Potamanthus luteus, *in Britain found only in stony lowland sections of the River Wye.*

Having mated, females fly upstream to a suitable stretch of the river and sit quietly whilst they form their eggs into a sticky bundle or 'raft', which is carried on their abdomen when flying over the water.

The raft is then dropped onto the water surface and it floats downstream, expanding rapidly and scattering the eggs. Each egg then sticks to the nearest solid object.

Adult stoneflies live for two to three weeks in the wild. There is one species of stonefly still found in Australia today which has remained unchanged from its fossil ancestors some 250 million years ago.

Two hundred species of caddisfly

Caddisflies or 'Sedges' may well be one of the earliest orders to have developed full metamorphosis and so form the link with our modern flying insects. Their larvae occur in two forms, 'case-bearing' and 'caseless'. In Britain we have 152 case-bearing species split into twelve families. Generally speaking these are the grazers, although occasionally they will eat flesh. Larvae of the 48 caseless species are split into six families, some of which are grazers and others are predators.

Cased caddisfly
Halesus radiatus,
larvae.

Within the order are some primitive families that have case-bearing and caseless species. All larvae are soft-bodied, so fewer skin changes are necessary, and most have some form of external gills. All, bar members of one family, are territorial and do not habitually drift downstream. They can spin silk which is used to cement a protective case together or, if caseless, to capture victims that drift into silken nets or become trapped by sticky silken threads. These silken webs are either spun between stones or over their surface. There is a handful of predatory species which actively hunt their prey amongst vegetation. In the caseless group there are some micro species. Larvae of each species have very specific requirements, so that some will only be found in headstreams at high altitude whilst others are found in slow, muddy sections of rivers. Some of the case-bearing caddisflies are found in marshy pools, ponds and lakes. Both larvae and pupae, particularly of the case-bearing species, are capable of pulsing water over their abdomen in order to increase the oxygen content in their bodies. Adult wings, when fully formed inside the pupa, are folded so that upon emergence the adult can unfold them rapidly and fly to some nearby vegetation where its wings are allowed to harden.

All adults bar one are full-winged and most are crepuscular by nature. Some species in the family *Leptoceridae* fly during the daytime, and nearly all species are easily attracted to artificial light sources. Some have quite complex pigmented wing patterns. Gravid females of the case-bearing species lay their eggs in two jelly-covered batches. These may be laid under water on a solid object, on vegetation overhanging water, or even on damp ground where pools form during wet periods. Gravid females of the caseless species always lay their eggs singly or in small batches underwater.

White-legged damselfly
Platycnemis pennipes
adult male.

Lowland species: River Wye, near Backney.

The importance of river flies

Our aquatic insects perform the vital service of purifying our river systems. During each year the grazers remove the excessive algal growth and detritus which accumulates on the riverbed. The predators control the numbers of grazing species so that a balance is reached. Without them, all game fish would soon starve to death and algae would soon start to bloom, turning the water green and blocking light from the riverbed. The algae then dies and is attacked by fungal growth and harmful anaerobic bacteria. The oxygen level in the water plummets and all plant growth disappears. Finally, our course fish starve to death and the water becomes poisoned. The water that we extract from our river systems for drinking purposes already has to be purified before we can drink it. How much further can we push our luck before we become poisoned?

There is little doubt that all our present river flies are the product of much evolutionary experimentation over periods of time which are hard to imagine. During that time there have been many changes in the earth's climate so that many species have become extinct, but today the survivors have reached the end of the line. Those that remain are all living fossils and should be given the protection that they deserve. Ask yourself this question: will we as a species survive for 200 million years on this planet? I doubt it very much!

Michael Hammett is a freshwater biologist and, as a wildlife photographer, regularly contributes to *Natur Cymru*.

Caddisfly Rhyacophila dorsalis, *adult.*

Ffosiliau byw ein hafonydd

Mae'r cymylau pryfed sy'n hofran uwchben ein hafonydd yn yr haf yn cynnwys rhai o greaduriaid hynaf y blaned, fel gweision y neidr, mursennod, gwybed Mai a phryfed y cerrig. Ceir amrywiaeth o gynefinoedd mewn system afon. Mae graddiant a chyfradd llif yn ffactorau pwysig a gall dŵr byrlymus llawn ocsigen fod yn bwysig iawn i wybed. Bydd nifer o drychfilod yn manteisio ar lif yr afon i'w cludo i fannau bwydo newydd yn ystod eu hoes.

Mae byd y trychfilod yn cynnwys pob math o ryfeddodau, fel larfae'r gwesynnod a'r mursennod sy'n cipio unrhyw fath o brae, gan gynnwys pysgod, gyda genau sy'n agor mewn microeiliad, a'r oedolion sy'n greaduriaid hedegog gyda'r perffeithiaf oll. Mae larfae llysieuol gwybed Mai yn amrywiol eu ffurf – rhai wedi addasu i gropian dros greigiau neu i durio ac eraill fel roced er mwyn symud rhwng chwyn. Wedi tyfu'n llawn bydd y larfae yn pwmpio awyr o dan eu croen allanol; allan o'r pothelli bach ariannaidd hyn y daw'r llwydion, sydd wedyn yn troi'n oedolion ac yn ffurfio heidiau paru mawr. Bydd y gwrywod yn marw'n syth ar ôl paru tra bydd y benywod yn hedfan i fyny'r afon a dodwy miloedd o wyau cyn marw.

Mae larfae pryfed y cerrig, sy'n cynnwys llysieuwyr ac ysglyfaethwyr, yn hoff o'r dyfroedd oer llawn ocsigen yn rhannau uchaf yr afon, ac yn troi'n swrth pan fydd y dŵr yn gynhesach. Ar ôl drifftio lawr yr afon wrth dyfu, daw'r larfae o'r dŵr a throi'n oedolion. Bydd y gwrywod a'r benywod yn galw ar ei gilydd gyda sŵn drymio sy'n unigryw i bob rhywogaeth ac wedi paru, bydd y benywod yn dychwelyd i rannau uchaf yr afon i ddodwy.

Tiriogaethol yw'r mwyafrif o larfae pryfed y gwellt (pryfed pric). Bydd rhai yn nyddu sidan i greu casyn amdanynt ac eraill yn ffurfio gwe er mwyn dal prae. Mae gan larfae pob rhywogaeth anghenion arbennig ac felly ceir gwahanol fathau mewn gwahanol gynefinoedd dyfrol. Mae'r larfae a'r oedolion i gyd yn gallu bwrw dŵr dros eu habdomen i gynyddu lefel ocsigen yn eu cyrff. Mae'r creaduriaid rhyfeddol hyn yn ffosiliau byw – maen nhw'n rhan bwysig o'r we fwyd sy'n cadw ein hafonydd yn lân ac felly yn haeddu parch!

Y Carneddau – *tirlun ddoe a heddiw*

Mae cadwyni moel y Carneddau wedi bod yn gadarnle i frodorion yr ardal ers cyn hanes, ac yn ddiweddarach i Dywysogion sy'n dal i gael eu cofio yn enwau'r copaon, Dafydd a Llywelyn. Mae gwedd y tirlun yma wedi datblygu dros filoedd o flynyddoedd yn sgîl y defnydd a wna dyn o'r tir. ***Jonathan Neale*** *sy'n cnoi cil dros y newidiadau i'r tir sy'n parhau i ddylanwadu ar y Carneddau.*

I'r ymwelwyr, sy'n dychwelyd yn rheolaidd i'r Carneddau, mae gan yr ucheldir anferthol yma yr holl nodweddion y disgwylir eu gweld mewn ardal fynyddig, wyllt. Mae'r merlod mynydd, sy'n crwydro ar hyd a lled yr ardal yma, hefyd fel pe baent yn cadarnhau'r argraff ramantus yma. Efallai fod y ceffylau a'r ardaloedd hyn yn ymddangos yn wyllt, ond a ydynt mor wyllt a 'naturiol' â hynny mewn gwirionedd?

Coed, hinsawdd fwyn a chnydau

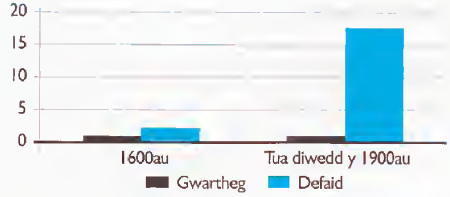
Pan ddaeth ein hynafiaid cyntaf i'r ardal yma, tua diwedd yr Oes Iâ fawr ddiwethaf, nid oedd y tirlun hanner mor agored ag ydyw heddiw. Fe welir gweddillion coed bedw yn gymysg yn y mawn oddeutu dwy fil o droedfeddi o uchder ar Garnedd Dafydd, a buasai coed felly wedi bod yn rhan amlwg iawn o'r tirlun yn ystod y cyfnod yma. Ond yn ystod yr Oes Efydd (oddeutu 3,000 o flynyddoedd yn ôl) wrth i'r hinsawdd sychu, aeth y ffermwyr cynnar ati i drin y tir a thyfu cnydau ar yr ucheldiroedd yma. Yn raddol, fe ddiflannodd y tirlun coediog, hynafol, ac yn sgil hyn fe ddirywiodd y pridd oherwydd erydiad a thrwytholchiad, gan greu'r cynefinoedd rhosydd a gweunydd "naturiol" a welir heddiw.

Cyfnod a dirywiad y bugail

Yn ystod y canrifoedd ers y Canol Oesoedd, mae'r traddodiad o gadw gwartheg wedi lleihau'n raddol gyda mwy o bwyslais ar ffermio defaid, yn enwedig yn ystod y ganrif ddiwethaf. Mae patrwm blynyddol ffermio defaid, yn enwedig gyda dirywiad bugeilio, wedi helpu i newid y fantol o du gweunydd i du glaswelltiroedd. Hefyd diflannodd y drefn o roi mylltar y mynydd trwy gydol y flwyddyn, gyda chynnydd yn yr arfer o roi

mamogiaid i bori yn ystod yr haf. Mae hyn wedi arwain at bori llai ar weiriau breision sy'n ffurfio tuswau, fel glaswellt y gweunydd (*Molinia caerulea*) a chawnen ddu (*Nardus stricta*), ac mae'r gweiriau yma felly wedi ymestyn eu poblogaethau i orchuddio rhannau helaeth o'r mynyddoedd yma. Ynghyd â'r newidiadau yn y gyfran o ddefaid a gwartheg, amcangyfrifir bod dwysedd y defaid hefyd wedi cynyddu yn ystod y cyfnod hwn o 0.5 o famogiaid ar bob hectar i fwy na 6.

Cyfran o Ddefaid a Gwartheg ar y Carneddau (1600-2000)



Merlod – bodolaeth ansicr

Yn ystod y cyfnod lle bu cynnydd mawr yn niferoedd y defaid a'r gwartheg, mae cyfanswm y merlod wedi aros yn bur sefydlog – sef oddeutu 250-300. Bu'r merlod caled yma yn ffynhonnell fasnach i'r ffermwr mynydd ar un tro wrth iddynt fynd i byllau glo y cymoedd (pit-ponies), ond yn ddiweddarach caent eu defnyddio o fewn y diwydiant merlota a'r diwydiant cig.

Er bod rhai'n teimlo bod naws naturiol yn perthyn i'r merlod, fe gânt hwythau eu rheoli yn ystod blwyddyn o waith ar fferm fynydd y Carneddau. Ym mis Hydref cânt eu casglu ynghyd, a symudir yr ebolion, y stalwyni a rhai o'r cesig hynaf oddi ar y mynydd a'u rhoi ar dir is i dreulio'r gaeaf. Caiff stalwyni o frîd eu rhyddhau ar y mynydd yn hwyr yn y gwanwyn, ar ôl i'r cesig roi genedigaeth i'w hebolion a'u hebolesau. Yn ystod gweddill y flwyddyn, prin iawn yw'r rheolaeth ar y merlod mynydd, ac fel arfer fe fydd y stalwyni'n ffurfio grwpiau o ryw bedwar i chwech mewn nifer, gyda chaseg yn cadw trefn o fewn y grwpiau hyn.

Ffermio, cadwraeth a'r tirlun

Mae mynyddoedd y Carneddau a'u nodweddion "naturiol" wedi esblygu wrth ymateb i newidiadau yn yr hinsawdd ac yn sgil rheolaeth dyn ar y tir, ac wrth reswm mae'r elfennau yma wedi bod ar droed ers miloedd o flynyddoedd. Mae'r newidiadau hyn yn parhau, ac erbyn heddiw mae'r Carneddau wedi ennill statws rhyngwladol oherwydd eu cynefinoedd a'u rhywogaethau o blanhigion ac anifeiliaid. Yn ystod y blynyddoedd diwethaf, mae cynllun amaeth y Cyngor Cefn Gwlad (Tir Gofal), ynghyd â dulliau rheoli eiddo yr Ymddiriedolaeth Genedlaethol, wedi chwarae rhan flaenllaw yn y dasg o sicrhau bod y fferm fynydd draddodiadol yn bodoli yng nghymdeithasau gwasgaredig ein hucheldiroedd. Ar yr un pryd, fe wneir hyn tra'n ceisio sicrhau bod yr ardaloedd eithriadol yma ar agor i'r ymwelwyr oll eu profi a'u mwynhau. Fe fydd y broses o gydbwyso mynediad, cadwraeth ac amaeth fwy na thebyg yn parhau am gyfnod hir iawn yn y dyfodol. Ond felly y bu pethau ar y Carneddau dros yr oesoedd – a pharhau i ddatblygu a wna tra bo'r byd yn troi.

Mae **Jonathan Neale** yn gweithio i Gyngor Cefn Gwlad Cymru fel Ysgrifennwr Erthyglau.

The Carneddau range

The appearance of Carneddau mountains has been greatly modified by man's activities, from the earliest forest clearances, which began around 3,000 years ago, to the more recent changes in grazing practices which have led to a substantial increase in sheep numbers but a decline in cattle grazing. The mountain ponies, despite their wild and 'natural' appearance, are also part of the farming system, although their value as pit ponies declined a long time ago. Centuries of climatic and human-induced changes have created habitats of international significance: nowadays, agri-environment and other initiatives play an important role in securing the existence of the traditional mountain farm and continuation of sympathetic management practices.

Farming to keep carbon:
A necessary response to climate change

The uplands of Wales are vitally important carbon stores. Photo: Joanna Robertson.

Wales has large stocks of natural carbon, and the way we manage these can have a bigger impact on climate change than our emissions from burning fossil fuels. A 1% loss of carbon stocks each year would increase our net emissions of carbon dioxide by 40%. Far from woodlands being the main repositories of carbon, most of the stocks are in grasslands and the uplands. Stocks can be maintained or increased by limiting grazing, restricting drainage and no tillage, as ***John Farrar***, ***Chris Freeman***, ***Davey Jones*** *explain.*

Much of the climate change debate is now familiar. The world is heating up, with the last decade the hottest since records began; not only is the climate getting warmer, but in western Europe it's getting wetter in winter and drier in summer. We know that many changes are already happening as a result: flowering and bird nesting are earlier, and sea levels are rising, for example. The cures are familiar too – we must switch energy generation to renewable sources, drive less, consume less, do anything that reduces our combustion of fossil fuels. What we want to explore here is a different issue, of great relevance to Wales, that probably has affected, and certainly will influence, climate change. It's about how we use land: if we get it wrong, we'll make climate change worse; if we get it right, we'll reduce it.

The human addition of carbon dioxide to the atmosphere is superimposed on the natural fluxes of carbon dioxide between the land and the atmosphere. The natural fluxes nearly balance – about as much carbon dioxide is fixed by plants photosynthesising as is released by plants, animals and microbes respiring. These fluxes are not quite the same: over the last 10,000 years a small amount of carbon has been stored each year in soils. It accumulates as organic matter to give soils – and especially peats – their dark colour. Some of the carbon in our soils has been there for over a thousand years (we know this – we can carbon-date it). So the questions are: how much carbon is stored (sequestered) in our soils? Is this carbon safely locked up there? Might changes in land use cause some of it to be released?

How much carbon is stored in Wales?

The plants of Wales fix only about 11 million tonnes of carbon a year – and natural processes release about the same amount back to the atmosphere. These are similar to Welsh Assembly Government figures for carbon emissions from combustion of fossil fuels: humans emit about 12 million tonnes. Whilst the global average is a 25:1 ratio of natural carbon cycling to human emissions, in Wales it is 1:1. Our unfavourable ratio is because population density is high and the population is, by world standards, wealthy; the climate is cool, thus limiting primary productivity, especially in the uplands; and the total solar radiation is low due to our high latitude, also limiting primary productivity.

However, the key figure is the amount of carbon stored in the soils of Wales. This is surprisingly large – about 500 million tonnes, compared with 30 million tonnes of carbon in the atmosphere above us and 50 million tonnes in plants themselves. So if only 1% of the carbon stored in Welsh soils was released to the atmosphere in a year, it would increase our carbon emissions by 40%. Such a huge increase would completely swamp any of our vital individual efforts to live more sustainable lives.

Peat is a particularly important soil type, since the most conservative estimate is that deep peats hold about 17% of the national carbon reserves. However, the average depth of peat in Wales measured in a 1970 survey is 3 metres, greater than this estimate assumed, so peats may contain nearly 40% of the national reserves. Some soils, such as temperate prairie grasslands, have reached carbon saturation. If this is true of peatlands then there is a disturbing possibility that carbon, rather than being sequestered, may instead be released back to atmosphere as the greenhouse gases CO_2 and CH_4.

Another critical issue is the role of woodlands. Trees are usually hailed as part of the solution to climate change: planting trees is a good thing because more carbon is locked up as a result. Well, up to a point: trees themselves do, at least while they are growing, but it also essential to consider the soils they are growing in. Per hectare, the carbon content of soil below trees is not as high as the carbon content of many soils in the uplands. Overall Welsh grasslands and forests differ little in their carbon storage per unit area, but as there is much less woodland than grassland, most carbon (over 80%) is associated with grassland and the uplands.

One inference is that Wales needs to monitor the carbon budget of its managed landscapes very carefully to help maximise the carbon sequestered. Unless we manage our carbon stocks very carefully, we will have very little room for activities such as carbon trading, or for using carbon sequestration in lieu of reductions of emissions. But even this may be too optimistic: is it possible that rather than being able to increase carbon storage, we may be more likely to lose some of the carbon that we currently store?

What effect does land use have on carbon storage?

We know that some forms of management will reduce carbon stocks. We've probably lost a lot of carbon over the past century due to programmes of draining and ploughing much upland vegetation, and increased grazing densities. So taking land out of forestry or permanent grassland for cropping will release carbon, whilst leaving land alone and reducing stocking densities will increase storage. We could talk of farming cows for carbon. Planting trees is not all it's cracked up to be, as the land preparation preceding planting may involve deep ploughing and drainage, which will lose carbon stores, and permanent grassland is as good a carbon store. So quite simple choices in land use will have dramatic effects on Wales' carbon balance and its contribution to global warming. Perhaps less simple is working out how to reward farmers who manage their carbon stocks well.

So we must manage our land to conserve – and perhaps increase – our carbon stocks. Since ploughing, draining and overgrazing can result in the loss of stored carbon, these are best avoided on our carbon-rich upland soils. If these soils are left undisturbed and the vegetation on them is lightly grazed we will be farming carbon – and also still able to farm cows and sheep. Fortunately this light-touch approach should be compatible with maintaining or improving biodiversity in the uplands. In the lowlands, since grassland holds two to three-fold

more carbon than arable soils, we can sustain a mixed agriculture which avoids ploughing established grassland – again compatible with maintaining biodiversity. We know that following conversion from grassland to arable, losses of carbon from the soil are rapid and large. Conversely, soil stocks only build up slowly after changing arable land to permanent grassland.

Is there a possibility of increasing our total soil carbon stocks?

Studies in north Wales have shown that soil carbon density is significantly affected by the intensity of sheep grazing, with grassland carbon stocks decreasing with increasing sheep numbers. Based upon limited data, we estimate that soil carbon stocks in Welsh grasslands could be increased by approximately 10% if grazing levels were reduced or removed. Most of the peatlands are located in upland areas and are sensitive to erosion and loss of carbon during periods of drought or drainage. Historically drainage of these areas has been considerable, but needs to be reduced to conserve carbon stocks. Potentially, by reversing peatland drainage throughout Wales, these peatlands could slowly accumulate carbon.

However our main conclusions are that it may be possible to make small increases in our carbon stores – but it is very easy to lose large amounts of already stored carbon by mismanagement, and this we must avoid. Carbon sequestration by peatlands may already be in decline. Atmospheric warming can reduce peat carbon stocks because soil biological activity is stimulated, increasing peat decomposition. Higher temperatures also increase rates of evaporation and transpiration leading to a drawdown of water tables and a greater chemical and biological oxidation of peat carbon. Together this would lead to a greater release of CO_2 to the atmosphere and of organic carbon into watercourses. Continued climatic and environmental change could eliminate the ability of peatlands to sequester carbon at a time when the exact opposite, increased carbon sequestration, is required.

There is one very positive sign – the Assembly's new Sustainable Development Action Plan explicitly acknowledges how important these soil carbon reserves are, and how they must be conserved in developing policies on farming, forestry and the countryside. Certainly incorporating these ideas in Tir Gofal and Tir Cynnal could be a major step forward, and one which starts to solve the problem of paying farmers for being gatekeepers for global warming.

Professor John Farrar is Director of the Institute of Environmental Science, University of Wales, Bangor. **Chris Freeman** and **Davey Jones** are senior lecturers in the Schools of Biological Sciences and Agricultural and Forest Sciences, University of Wales, Bangor.

Carbon – cynnyrch mwyaf gwerthfawr tir fferm Cymru?

Mae newid hinsawdd yn her anferthol a chyfarwydd, a chydnabyddir bellach bod defnydd tir yn ffactor allweddol wrth geisio'i daclo.

Oherwydd anghydbwysedd yn y cylch carbon naturiol gall cyfanswm arwyddocaol o garbon gasglu yn y pridd dros amser. Mae cyfanswm y carbon ym mhriddoedd Cymru yn llawer uwch na'r hyn sydd yn yr atmosffer ac mewn planhigion. O golli 1% o garbon y pridd bob blwyddyn byddai'n gollyngiadau carbon yn cynyddu o 40%. Mae'r rhan fwyaf o'r carbon pridd yng Nghymru (80%) yn gysylltiedig â glaswelltir ac ucheldir. Mae mawn yn allweddol ac efallai'n dal cymaint â 40% o'r gronfa hon o garbon, ond oherwydd bod cynhesu byd eang yn cyflymu dadfeiliad ac ocsideiddiad mawn mae peryg y gall newid hinsawdd leihau gallu mawndir i storio carbon.

Mae defnydd tir yn allweddol i gynnal y cydbwysedd carbon a rhaid i bolisïau a chynlluniau amaeth-amgylcheddol gymryd hyn i ystyriaeth. Er na ellir cynyddu cyfanswm y carbon yn y pridd rhyw lawer, hawdd fyddai ei golli trwy gamreolaeth. Gall aredig dwfn a sychu tir fod yn andwyol ond mae lleihau lefelau pori, gadael llonydd i hen weirgloddiau a chau ffosydd ar fawndir i gyd yn weithgareddau buddiol – i fioamrywiaeth yn ogystal â'r gronfa garbon.

Reeds meet needs – *how, with a little help, reedbeds can benefit people and nature*

All photos: Ian Nichols.

In the 20th century human and nature's needs generally conflicted. But it wasn't always so, and this century a different trend could become apparent: ***Vicky Moller*** *begins a series of reports on emerging green businesses in Wales with a look at two businesses which protect and create reed beds to meet some very basic needs.*

Drive over the Old Iron Bridge in Newport, Pembrokeshire, and on most clear days you will pass a row of backs. People motionless, watching the vibrant complex bird life on the estuary mud and reed banks. The birds and their watchers depend on a habitat which is kept healthy thanks to the efforts of one man and his friends.

He is not paid by any wildlife trust but he keeps reed beds from filling in and changing. He is Alan Jones, a thatcher who harvests the reeds annually to turn them into warm roofs: otherwise they would die off and provide a muddy mulch for other plants to root in, to be followed eventually, in natural succession, by willow and alder carr. This would deprive the wetland birds of their nesting and feeding habitat.

Within living memory many of the tidal estuary reed beds were harvested to make weatherproof caps for outdoor haystacks, and barn and cottage roofs. Marsh harriers, reed buntings and bitterns were just some of the birds that benefited from the rich invertebrate population and the nesting cover. Alan chooses his harvesting dates with care. They have to be late in winter so the reeds are clean of leaves, in February to avoid nesting times. To find the lowest tide he consults the moon calendar, and it has to be a weekend to suit the volunteers who are part of the social dimension of Alan's thatching. An interesting motley crew, they are people into green building, doing the work in part-payment for thatch, or into hanging out in a stunning setting while getting exercise in a nostalgic pursuit.

Harvesting is done with a machine called an Allen-scythe. It has a little motor and two rows of teeth-filled blades like crocodile jaws which work like scissors. It is light and doesn't disappear into the mud (too often) and doesn't clog up; it is a loved, well-made tool which has never been bettered, though replaced by heavier-engined ride-on mowers for orchards and lawns. The volunteers bundle and tie the reeds, cleaning off grasses, and stack them ready for carrying or boating them to dry land before the tide returns.

Like many skilled people in Wales, too much of Alan's work is out of the country. The main demand is in the south-west, where he was discovered as a self-taught thatcher by the UK master, Jack Lewis, who took Alan under his wing. Since then it has been his passion, not just a career. Alan told me of a great convergence of 30 UK thatchers, united in the task of building a thatched village in Holland. At night in the pubs talk was animated, but it was all around thatching; if the subject strayed for more than 20 minutes people began to get twitchy.

There is some work in Wales, in visitor attractions such as Dan yr Ogof or Castell Henllys, the Iron age fort near his home. The first thatched roofs appeared thousands of years ago, resembling those we can still see today on huts in parts of Africa or Asia. Alan was a heritage restoration carpenter when he started at Castell Henllys. The pioneering owner, Huw Foster, wanted the thatch to be amateur and authentic, and Alan offered to have a go. Like his prehistoric forerunners, he had to learn on the job.

It was here that he later started working with children, who discovered that they could become roofers within an afternoon, and feel the thrill of helping to create a home. Working with straw or reed is addictive: you can do it badly but it still works, and the longer you continue the neater, faster and stronger the result becomes. That was 23 years ago. Recently children in a Brecon Beacons school were getting up to mischief. They needed a place of their own, but would they vandalise it? The result – they have slowly built a beautiful den, using untreated, locally harvested roundwood. Alan showed them how to thatch it; the work took two years and 60 children, the smaller children standing on boxes to do their bit of thatching. The den is not within the school grounds, it is open to the community, but four years on it is still there, undamaged, and well-used. The theory about ownership and responsibility holds water!

Talking of holding water, most people are ignorant about the working life of a thatch roof. Many Welsh homes were roofed with long straw and re-roofed every 5-10 years. This was a by-product of cereals grown throughout Wales before the days of global food distribution and central planning. If the straw was combed – ordered into straight-lying stalks – the roof lasted around 20 years. Water-reed should last 30-40 years in Wales, 60 in the dryer south east of Britain. But BEWARE, there are serious cowboys out there. Posing as advisors and members of trade organisations, they sell their own services and use inferior imported reed. Botched thatching means that Alan and other master thatchers often have to try to rectify the situation a few years later.

Style is another subject of passion for Alan. Each county had its own style, reflecting social arrangements, tastes and so forth. Wales was known for unpretentious styles which functioned beautifully. The ornamental plaits associated with the south of England were attached to a snobbery alien to Welsh building. It causes thatchers physical pain to see styles parachuted in from another culture – the opportunities to recreate the vernacular beauty of thatch are infrequent, it is tragic to miss them.

The relationship between the thatcher and wildlife and global ecology is a good one. There are no net carbon dioxide emissions in a thatch roof, the material holds carbon for its many decades of life as a roof, and reduces losses of heat through its Herculean insulation properties. It can be placed on a light wood structure made of local, green roundwood. Any movement as it dries is comfortably accommodated by the deep thatch. At the end of its life it can become bedding; mixed with manure it enriches the earth and supplants the need for chemical fertiliser. And both reedbeds and long-straw crops are insect and mammal havens, and bird feeding and nesting sites through the spring and summer before harvesting.

But reedbeds are useful in other ways. Water Authorities and engineers are creating reedbeds to purify water containing chemicals and farm or human sewage. The effluent is applied in doses onto sand and gravel filters planted with reeds. As the liquid trickles through it becomes aerated and bacteria go to work breaking down the pollutants. Later stages, which can include ponds, allow settlement of finer solids and natural UV treatment from sunlight. Reedbed systems are sealed engineered systems similar to conventional sewage treatment works. They do require space, however, at least 1m square per person. The conventional alternatives, the UV light-bulbs which are now standard for tertiary sewage treatment, are very expensive to replace and to run. And there is a risk, I am told, because UV bulbs break up the DNA of micro-organisms, enabling cross species penetration and increasing mutations.

Jamie Ashe is a young water engineer in North Pembrokeshire. He started in business servicing and installing private water supplies three years ago but a sideline, reed-bed water cleansing, has grown to become his main income. Interest comes from unserviced households, farms and small housing developments. Caravan parks are particularly suitable, often being near rivers, estuaries and bathing beaches. Reedbed filtration relies on bacterial activity which works best in warm summer temperatures when the parks are full, so there is a natural match between feed material and processing. The reeds waving innocently in the wind are actually the top layer of a carefully designed, controlled, automatic and naturally powered modern machine: and the reedbeds can be landscaped with walk-ways from which to watch the bird and insect life.

I was shown round a small reed bed treating the effluent for 50 houses in Eglwyswrw. The Dŵr Cymru engineers showed me the crystalline water, which they said they could drink (but didn't), discharging from the end of them. A fixed monitor recorded coliform content: they told me results were better than from UV bulb treatment. As I was leaving they ran after the car to point out the birds in their impeccably kept and annually harvested reed bed.

Reed bed thatch and water treatment have no environmental down-side. The water treatment relieves our overloaded sewage treatment and, once established, has no energy costs. Thatch replaces insulation costs, makes the air sweet for the inhabitants, keeps alive building artistry and ultimately biodegrades harmlessly. All this and carbon neutral too.

The only irony in the sunny tale of Alan Jones, is this – he builds homes of heritage quality for humans and provides habitat for nature, but he himself is homeless, or rather can only afford to rent rooms in our present unaffordable housing market. He is only one of the builders I know for whom owning a home is still a dream.

Vicky Moller, a supporter of local green businesses and an Eco-page writer, having brought up five children on a small-holding, has returned to active politics as Chair of Plaid Cymru's Green Branch.

Alan Jones can be contacted on 07971 705961 or 01239 820099, and Jamie Ashe on 01239 821176.

The end result.

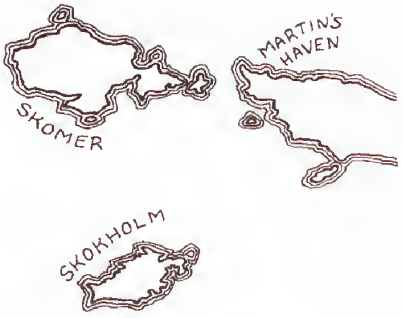
Cyrs – cyfaill dyn

Mae aber yr afon Nyfer, yn Sir Benfro, yn gynefin da i fywyd gwyllt ac yn ffynhonnell bywoliaeth i un crefftwr lleol. Ar ddiwedd pob gaeaf, ond cyn i'r adar ddechrau nythu, daw Alan Jones yma gyda'i wirfoddolwyr i dorri cyrs ar gyfer ei doeau gwellt. Bu'n perffeithio ei grefft ers nifer o flynyddoedd ac er mai gweithio y tu hwnt i'r ffin y bydd Alan fel arfer, mae galw am ei arbenigedd yng Nghymru weithiau. Yn ddiweddar bu'n cynorthwyo criw o blant i godi adeilad ym mro Brycheiniog – gan helpu meithrin teimlad o berchnogaeth a boddhad.

Mae ansawdd y gwaith yn bwysig iddo: gall to cyrs brodorol bara o leiaf 30-40 mlynedd – dipyn yn hirach na'r toeau traddodiadol o wellt bras, a'r rhai a grëir o gyrs tramor. Rhaid cadw cymeriad lleol hefyd – toeau gwellt syml yw'r rhai Cymreig. Mae cyrs yn ddefnydd ardderchog – fel to mae'n gynnes, yn cadw carbon am flynyddoedd maith ac, yn y pen draw, gall gael ei gymysgu gyda thail i greu gwrtaith. Mae gwelyau cyrs hefyd yn arbennig fel systemau ymarferol i hidlo a phuro dŵr.

Islands *round-up*

News from Skomer & Skokholm

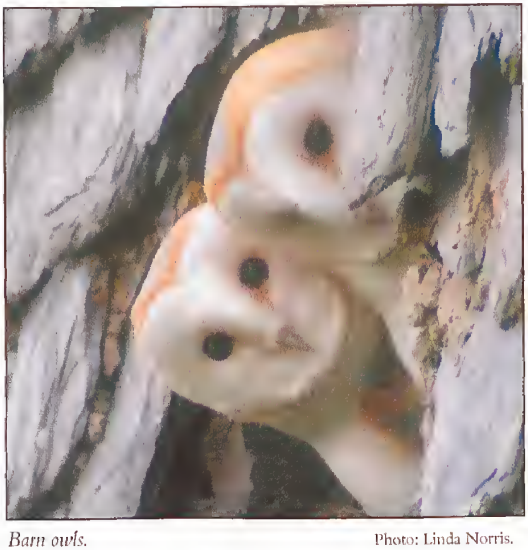


More news on disturbance

Voluntary codes produced by the Pembrokeshire Coastal Forum aim to control the activities of fast tourist boats round the islands. A pre-season meeting of the Forum handed out 'accreditation' to all those attending, this reward acting as a carrot presumably, because some of the operators visiting Skokholm had certainly not earned it, with their previous inconsiderate behaviour. Staff on Skokholm had high hopes for a more peaceful summer for the wildlife (and themselves!). In the event, as in 2003, only one of the two main operators was helpful during the season, others not at all so, and continuing efforts will have to be made to encourage these ruthless people to be more sensitive to the wildlife they are exploiting.

Land birds and mammals

Skokholm: During April seven pairs of Canada geese were found to be nesting, and all eggs were removed under Assembly Government licence in an attempt to keep their numbers down. The first pair bred in 1999, since when numbers have been increasing steadily; the flock size reached over 70 birds on one occasion, when birds visited from mainland



Barn owls. Photo: Linda Norris.

Pembrokeshire. However, the license will apparently not be renewed in 2005, since at present there is no evidence to show that the 'feature' species and habitats on the island are being deleteriously affected by the geese. Judging from increases elsewhere, the population could get considerably bigger.

Skomer: Barn owls successfully nested in the old farmhouse – the first documented breeding record since Robert Drane described a pair nesting amongst gulls and cormorants on the Mew Stone in 1897! One wonders what they found to eat, as the ten-yearly island-wide Skomer vole census showed numbers were very low, with disease probably a factor.

Dolphins and seals on Skomer

Spectacular displays of common dolphins included groups in excess of 200 animals close to the island on 28 July and 31 August. A number of yearling grey seals were spotted with bleeding mouths, possibly a result of lungworm, but pups did well, with 160 born by late October.

Seabirds

Skokholm: All of the breeding seabirds continued on their normal trend: great black-backed gulls increased, but lesser black-backed gulls had another abysmal season, only fledging about 100 chicks from the estimated 2,200 nests. Herring gulls remained around the 300 pair mark, this year raising very few young indeed. Guillemots and razorbills continued to increase, both again topping the 1,000 individuals mark.

Skomer: The number of nesting kittiwakes was down by one third on 2003. The last time so few attempted to breed was 1967. Chick survival was average, however, and it was possible that adults were in adverse condition due to poor foraging on wintering grounds. A comprehensive storm petrel census using tape playback produced an estimate of 248 apparently occupied sites. This is up by one third on last year's estimate, which itself was the highest using this methodology. New sub-colonies are still being discovered.

Rare birds in spring included green-winged teal, osprey, firecrest, nightingale, two red-backed shrikes and quail, while autumn produced the second citrine wagtail for Wales, Skomer's second red kite, black-headed bunting, Richard's pipit, yellow-browed and barred warblers, woodchat shrike, common rosefinch and a number of wrynecks and Lapland buntings.

Compiled by **Geoff Gibbs** from material supplied by **Juan Brown** (Skomer) and **Graham Thompson** (Skokholm).

Talking **plants**

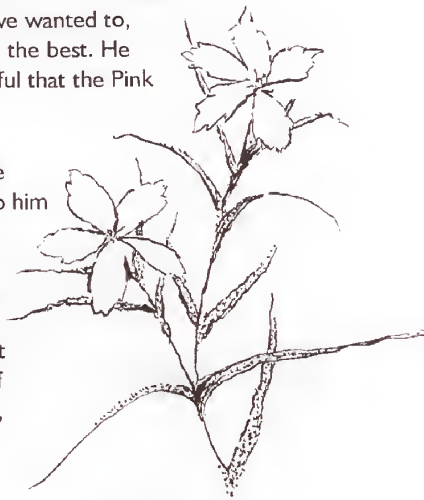
Trevor Dines finds that communication is at the root of successful plant conservation

Working for Plantlife Wales, I have found that an essential part of any conservation effort is good communication. Engaging your target audience is vital, whoever it may be, but can be difficult to do successfully. When dealing with plants, which are literally rooted to the spot, often only one audience really matters: the landowner or land-manager. Although new policies and schemes may influence how they manage their land, as custodian of the 'turf' on which your rarity grows they ultimately wield the Sword of Damocles over its head. But how many frontline conservation workers actually take time to talk to farm owners, tenants or farm workers?

Deptford Pink *Dianthus armeria* is a UK BAP species that has declined from 26 sites in Wales to just four – one in Flintshire, one in Carmarthenshire and two in Glamorgan. All these sites now have thriving populations thanks to management by volunteer Plantlife Flora Guardians and landowners. The Pink is remarkable in its ability to re-appear at old sites following disturbance, thanks to its long-lived seed. At one former site in mid-Wales we have long hoped to undertake work with a view to recovering this species. The plant was last recorded in the 1950s and the bank on which it grew is now heavily overgrown with gorse. However, the farmer who owns the site was very reluctant to allow us to do any work, and it was important to understand why. What precisely were his fears?

A CCW colleague and I therefore spent an afternoon chatting with him, his mother and his children in their farmhouse. Conversation ranged from the state of farming to recent local housing developments and even included a discussion of the best computer games for a Nintendo. It was only in the final few minutes of the meeting that we talked about the Pink, and it quickly became clear that he had one major reservation: that if we did the work and the plant reappeared, he would immediately have a SSSI slapped on his land. There were many reasons why this would not be the case, and so after a few more conversations, another afternoon at the farmhouse and a letter from CCW, he agreed to let us do the work.

Two weeks later a group of Plantlife and CCW volunteers were on the site, making a great start at bashing the gorse. During the afternoon the farmer came to see what we were up to. I think he still regarded us as slightly mad, but he'd obviously got some enthusiasm for the project, saying that we could do whatever work we liked on the site whenever we wanted to, and he wished us all the best. He even sounded hopeful that the Pink would reappear.



The point is that we took time to chat to him and understand his concerns. We also built a relationship with him and his family, and with that came a modicum of trust. Far too often, I think those of us who work in conservation fail to engage the farming community properly. We assume that if a farmer is sent technical information on the decline of a species and guidance on management, our job is done. It's not; there are too many other factors that feed into the decision. I'm not saying that it's easy or that all farmers can be cajoled into working sympathetically with us, but we should at least be able to talk to them intelligently and give them the time and credit they deserve.

Trevor Dines is Swyddog Plantlife Cymru/ Plantlife Wales Officer

Silff Lyfrau *Amgylcheddol*

Tyddynnod y Chwarelwyr
Dewi Tomos
Llyfrau Llafar Gwlad, Rhif 59
Gwasg Carreg Gwalch 2004, £4.95
0-86381-926-5

Dyma un o gyfrolau mwyaf swmpus cyfres Llyfrau Llafar Gwlad ac mae'r awdur yn amlwg yn hynod o wybodus am hanes ardal Uwchgwyrfai, y talp mawr o ucheldir sy'n gorwedd ar gyrion pentrefi Rhosgadfan, Fron, Cilgwyn a Charmel, nepell o Gaernarfon. Dyma filltir sgwâr yr awdur o ddyddiau ei blentyndod ac mae'n ysgrifennu gydag arddeliad am y fro. Cawn glywed am y ddaeareg, y byd natur, yr archeoleg, hanes defnydd tir, y gymdeithas a'r diwylliant, llên gwerin, y diwydiant chwarelyddol a hefyd y cymeriadau lleol – nifer ohonynt yn enwogion cenedlaethol, fel Kate Roberts a'r dramodydd John Gwilym Jones. Mae'r awdur hefyd yn crynhoi'r newidiadau economaidd a chymdeithasol sydd wedi digwydd yn yr ardal – ac maen nhw wedi bod yn newidiadau mawr.

Mae ôl ymchwil manwl ar y llyfr hwn gyda llawer o wybodaeth yn deillio o ddogfennau archif, megis mapiau degwm a'r cyfrifiad. Mae nifer o ffotograffau, diagramau a llinfapiau syml iawn wedi cael eu cynnwys yn y llyfr i hebrwng y testun a chawn hefyd ddyfyniadau llenyddol niferus, yn enwedig yn yr adrannau ar y tyddynnod, y pentrefi a'r gymdeithas. Daw llawer o'r rhain o waith awduron lleol fel Lisi Jones a Kate Roberts, ac mae'r llyfr hefyd yn rhoi cyfle priodol i'r awdur son am y fenter y mae'n rhan ohoni i adfer Cae'r Gors, sef cartref Kate Roberts, i fod yn ganolbwynt i weithgaredd treftadaeth yn y fro.

Mae'n tynnu ar ffynonellau eraill diweddar hefyd, megis yr arolwg amgylcheddol ac amaethyddol o dir comin Uwchgwyrfai a gynhaliwyd yn 2000 er mwyn canfod ffordd gytbwys o reoli'r tir yma er budd amaethyddiaeth, bywyd gwyllt a chymunedau lleol.

Ond nid llyfr disgrifiadol yn unig yw hwn. Mae'r awdur hefyd yn cynnig sylwadau ar ddyfodol y tir comin ac yn herio'r darllenydd i ffurfio barn – er enghraifft, ar y berthynas rhwng cymwynasgarwch ac angen.

Dyma astudiaeth leol ardderchog sy'n llwyddo gwau gwahanol agweddau ar dirlun a chymdeithas hynod. Mae'r gwaith yn enghraifft o'r hyn y gellid ei gyflawni ar hyd a lled Cymru ac er, efallai, mai diddordeb lleol yn bennaf sydd mewn rhai o'r manylion, megis hynt a helynt teuluoedd ac aneddiadau unigol, mae'r cyfanwaith yn disgrifio rhan o'r dreftadaeth Gymreig sy'n perthyn i ni gyd.

Y Dyn a Blannai Goed
Jean Giono (cyfieithiad gan Martin Davis)
Gwasg Carreg Gwalch 2004, £4.95
0-86381-940-0

Llyfr tyner ac araf yw hwn ond mae ei neges yn un fawr ac oesol. Nid oedd y cyhoeddwyr Americanaidd a ofynnodd i Jean Giono, nôl yn 1953, i ysgrifennu am 'gymeriad bythgofiadwy', yn fodlon â'i ddewis o gymeriad dychmygol. Yn y pen draw, derbyniwyd y stori gan '*Vogue*' a'i chyhoeddi dan y teitl gwreiddiol 'Y Dyn a Blannodd Obaith ac a Dyfodd Hapusrwydd'.

Nod yr awdur wrth greu cymeriad Bouffier, sef y gwerinwr a blannai goed, oedd i wneud i bobl garu coed, neu yn fwy penodol i garu *plannu* coed. Mae'n addas iawn felly bod y llyfr hwn wedi cael ei gyfieithu i'r Gymraeg yn ystod y flwyddyn a welodd lansiad ymgyrch elusen Coed Cadw i blannu coeden frodorol ar gyfer pob plentyn dan 16 oed yng Nghymru.

Er mai syml yw'r stori nid yw wedi ei hysgrifennu yn benodol ar gyfer plant. Mae'r cyfieithiad yn cyfleu'r un naws hen ffasiwn, ffurfiol a bonheddig sydd yn nodweddu'r addasiad Saesneg – a phriodol yw hyn efallai gan fod y stori wedi ei lleoli yn Ffrainc yn ystod degawdau cynnar yr 20fed ganrif.

O'r tudalennau hyn daw negeseuon bythgofiadwy . Pwy allai wadu'r gwirionedd mai nid clod a hunanbwysigrwydd yw'r allwedd i lwyddiant, mai wrth ddyfalbarhau a chadw'n dawel y cyflawnir y gorchestion mwyaf a bod angen cyfeillion sy'n gallu adnabod rhywbeth gwerthfawr pan ddont ar ei draws - a hefyd bod pethau amgenach na materoliaeth yn allweddol i greu dedwyddwch a sicrhau iechyd ymhlith pobl.

Mae darllen y llyfr hwn gyda'i ysgythriadau pren trawiadol yn creu rhyw deimlad o lonyddwch, a theimlad o galondid hefyd bod modd i rai ddarganfod y 'canol llonydd distaw', ac o wneud hynny, i gyflawni pethau mawr.

Mae'r darluniau, y cyflwyniad gan Twm Morys a'r ôl-nodyn sy'n egluro mwy am fywyd a gwaith Jean Giono ei hunan, yn ychwanegiadau gwerth chweil i'r llyfryn hwn sydd wedi ysbrydoli llawer ar draws y byd i fynd ati i adfer coedwigoedd.

Mae pwt o ddiweddglo yn egluro mwy am gynllun 'Coed i Bawb' Coed Cadw ac yn rhoi gwybodaeth ymarferol i helpu ysgolion gael gafael ar adnoddau defnyddiol, gan gynnwys coed i'w plannu!

Green Bookshelf

Chwyn Joe Pye a Phincas Robin

Bethan Wyn Jones
Llyfrau Llafar Gwlad, Rhif 60
Gwasg Carreg Gwalch 2004, £5.50
0-86381-925-7

Mae'r casgliad yma o erthyglau yn cyflwyno myrdd o wybodaeth am blanhigion a chreaduriaid cefn gwlad Sir Fôn, a hynny gan awdures sy'n amlwg wrth ei bodd â'i milltir sgwar. Maen nhw eisoes wedi gweld golau dydd, fel petai – ar lafar ar y radio ac yn ysgrifenedig ym mhapur *Yr Herald*. Nid yn annisgwyl felly, mae'r erthyglau hyn i gyd wedi cael eu hysgrifennu yn gartrefol ac anffurfiol – mae'n bosib dychmygu bron, wrth eu darllen, bod yr awdures ei hunan yn eich tywys ar daith gerdded bersonol drwy ei hoff leoedd.

Mae plethiad o gyfeiriadau gwahanol – at farddoniaeth, coelion, iaith, arferion, ac ecoleg – yn nodweddu pob erthygl. Cawn glywed ffeithiau diddorol am darddiad ac ystyron enwau rhywogaethau, ynghyd ag esboniadau cryno a syml ynglŷn â'u hecoleg – sut mae eirlysiau yn dygymod â rhew, er enghraifft, neu sut mae cocos yn bwydo, a pham fod rhai dail celyn yn fwy pigog na'i gilydd.

Mae nifer o atgofion personol yn gwau drwy'r llyfr ac yn ein hatgoffa o'r modd y mae byd natur, mewn gwahanol ffyrdd, yn cyffwrdd â'n bywydau ni gyd. Fan hyn a fan acw yn y llyfr, clywn fwy am farn bersonol yr awdures ar ambell bwnc – fel ei diflastod gydag arwyddion cefn gwlad 'swyddogol' sy'n tynnu oddi wrth brofiad unigol yr ymwelydd.

Mae'n siwr mai cost oedd yn gyfrifol am leoli'r lluniau i gyd yng nghanol y llyfr. Byddai wedi bod yn braf eu gweld yn hebrwng yr erthyglau perthnasol ac mi fyddai rhywun yn disgwyl, y dyddiau hyn, i argraffwyr ddefnyddio technoleg gyfrifiadurol er mwyn sicrhau bod ansawdd pob delwedd mor gyson uchel â phosib. Ond, er hyn, mae'r lluniau'n hollol bwrpasol ac yn ddefnyddiol i adnabod ambell un o'r rhywogaethau mwy anghyfarwydd.

Llyfr i bori ynddo, neu i'w ddarllen ar un eisteddiad, yw hwn ac yn gymysgedd o ffeithiau cyfarwydd a newydd i'r rhan fwyaf o ddarllenwyr. Mae'n siwr hefyd y bydd sawl un o'r erthyglau yn sbarduno atgofion – ac yn ysgogi ambell daith sylwgar allan i'r wlad o'n cwmpas.

Elinor Gwynn

Nature Cure

Richard Mabey
Chatto & Windus 2005 £15.99 hardback
0 7011 7601 6

Richard Mabey has been busily redefining our relationship with nature in his books for years. In *Food for Free*, nature is good enough to eat; in *The Common Ground*, it is where we fit in.

Now Mabey has gone one step further. *Noture Cure*, the story of his recovery from deep depression to reconnect with nature, is part love poem, part essay, part drama. Defying categorisation, it is on its own.

In his account of physical and psychological progress and change, including his move from his beloved Chiltern home country to a Norfolk fen, there are several redemptive forces at work. His recovery is at first tentative, a search for his place within nature, his *cynefin*, where he fits in; gradually nature becomes both spur and mirror to his revitalised imagination; he becomes a 'dusker', alert, thought sensations streaming like bats from a roost.

Equally this is a love story, the working out of, and fitting into, one critically important human relationship and other friendships. Told with restraint, this provides a moving personal underscore, binding together his at times heterogeneous collection of thoughts and observations.

Perhaps the greatest therapy for Mabey has proved to be the practice of his calling, writing. It is a tuning-fork, connecting his highly-tuned system to the vitality of nature. He uses words with precision, but equally delights in ambiguity and word play.

He takes gentle, justified swipes at various human targets, and paints a compelling picture of the natural world 'from inside the hedge looking out'; he draws on many old threads which have run through his life and previous works, such as his affinity with Gilbert White and John Clare, and picks up some new ones. He travels to America in pursuit of wilderness, but finds the quality of wildness, caught in the imagination, in commoner ground. In summary, *Nature Cure* is a compulsive read, a book to savour, to revisit, and to be thankful for.

James Robertson

Cymru *a'r byd*

gan Morgan Parry

Bu *Natur Cymru*, ers y cychwyn cyntaf, yn croniclo'r ffordd y mae gwaith Llywodraeth Cynulliad Cymru wedi effeithio ar gadwraeth natur, a hynny oherwydd y dylanwad cryf sydd gan y Cynulliad dros ddynodi safleoedd a thros amaethyddiaeth a chynllunio, o ganlyniad i'r dyletswyddau a roddwyd iddo gan Ddeddf Llywodraeth Cymru. Mae'r sylw hefyd wedi bod yn gydnabyddiaeth o'r ffaith bod polisïau cymdeithasol ac economaidd yn effeithio ar y byd cymaint â pholisïau amgylcheddol ac felly bod byd natur, yn ddigon priodol, yn bwnc hynod o wleidyddol yng Nghymru.

Ond gan ddechrau gyda'r rhifyn hwn bydd y golofn hon yn edrych ar y pwysau ehangach ar y byd naturiol tra'n cadw llygad o hyd ar waith Llywodraeth y Cynulliad. Dros y blynyddoedd diwethaf mae llywodraethau wedi bod yn fwyfwy cyndyn i basio deddfau i warchod yr amgylchedd neu i wneud unrhyw beth sy'n wirioneddol werth chweil i atal colledion bioamrywiaeth ar hyd lled y byd. Mae rhai yn dadlau mai arwydd yw hyn bod grym llywodraethau yn dirywio wrth i fuddiannau busnes gynyddu eu gafael a'u rheolaeth dros adnoddau naturiol y byd. Yn ddi-os, mae ein ffordd o fyw a'n penderfyniadau fel defnyddwyr yn cael eu dylanwadu'n drwm gan y sector preifat sydd yn ei dro yn cael ei yrru gan dechnoleg – ac mae llywodraethau yn gyndyn iawn i ymyrryd.

Ond beth felly yw'r rhagolygon ar gyfer ail hanner y degawd? Er bod newid hinsawdd ar agenda sawl cenedl, mae cynhadledd Johannesburg yn 2002 wedi pylu i gorneli pellaf y cof ac nid oes fawr o waddol i'w weld ar ei hôl. Er ein bod ni yng Nghymru yn dod yn fwy cyfoethog bob blwyddyn, twf economaidd yw'r prif flaenoriaeth o hyd. Er mai dymunol yw sicrhau datblygiad economaidd er lles y tlawd, sut mewn gwirionedd gellir cyfiawnhau hybu datblygiad economaidd er mwyn dyrchafu cyflwr byw y cyfoethog yn uwch fyth – a hynny gyda'r fath dystiolaeth o'n cwmpas ein bod ni wedi cyrraedd terfynau byd eang ar sawl cyfrif? Y cyfan mae'n gwneud yw troi adnoddau naturiol ac ynni yn llygredd ac yn entropi.

Er siom i lawer o bobl, mae addewidion Tony Blair ynglŷn â newid hinsawdd wedi bod yn rhai gwag. Golyga hyn nad oes gennym yr un gwleidydd credadwy ymhlith cenhedloedd cyfoethog y byd i hyrwyddo ymdrechion sy'n mynd i'r afael â newidiadau hinsawdd. Roedd ei araith yn Davos yn amwys, a dweud y lleiaf, ac mae wedi ildio i fuddiannau busnes yn y drafodaeth ynglŷn â chynllun i fasnachu allyriannau. Mae ei swyddogion hefyd wedi bod yn ystyried dileu yn llwyr y targed cymedrol sydd gan y DU i ostwng carbon. Os bydd y newidiadau hinsawdd hynny sy'n ganlyniad i weithgaredd dyn yn cynyddu tymheredd cymedrol y byd yn fwy na 2°C bydd yr effaith ar rywogaethau a chynefinoedd yn frawychus. Newid hinsawdd yw'r bygythiad mwyaf sy'n wynebu dynoliaeth a dylai fod yn bwnc allweddol yn yr etholiad cyffredinol sydd ar drothwy'r drws. Ond mae'n siwr gen i na chaiff fawr o sylw.

Mae amaethyddiaeth arddwys (sydd o dan rym yr archfarchnadoedd anferth) yn dal i effeithio ar ecosystemau'r ddaear ar hyd a lled y byd, fel yn wir y mae gor-bysgota yn effeithio ar ecosystemau'r moroedd. Gallai'r DU daclo'r dirywiad parhaol mewn bioamrywiaeth ac mewn hyfywedd economaidd cymunedau arfordirol pe bai'r Llywodraeth yn cyflawni ei addewid ac yn cyflwyno deddfwriaeth gynhwysfawr newydd. Ond o weld pa mor hawdd y llwyddodd y diwydiant pysgota, nol cyn y Nadolig, i berswadio Gweinidogion i anwybyddu cyngor gwyddonwyr a'r Comisiwn Ewropeaidd, mae'n amhosib teimlo'n hyderus bod y Llywodraeth am barhau i fod yn bendant ynglŷn â hyn.

Pe bai angen mwy o dystiolaeth arnom fod cadwraeth cynefinoedd naturiol o fudd i ddynoliaeth, fe'i cawsom gyda thrychineb y tsunami yn Asia. Gwelwyd llai o ddifrod ar hyd y glannau lle'r oedd riffiau cwrel a fforestydd mangrôf yn bresennol (ac felly yn gallu amsugno peth o nerth y tonnau), o gymharu â'r darnau hynny o arfordir lle'r oedd y riffiau wedi cael eu difrodi a lle'r oedd y fforestydd mangrôf wedi cael eu disodli gan ffermydd corgimwch a datblygiadau twristaidd glan môr. Ond nid pawb glywodd y neges yng Nghymru: roedd ffermwyr yn barod i ymateb yn sydyn i'r tywydd stormus diweddar, gan alw ar i afonydd gael eu carthu ac i diroedd gwlyb gael eu sychu er mwyn atal llifogydd yn y dyfodol – yn union i'r gwrthwyneb i'r hyn sydd ei angen.

Mae *Natur Cymru* yn chwarae ei ran drwy geisio poblogeiddio gwyddor cadwraeth. Ond mae angen iddo hefyd dynnu sylw at ddeddfwriaeth bellgyrhaeddol, at bolisïau goleuedig, at benderfyniadau cyfrifol ym myd busnes ac at newidiadau cymdeithasol mwy cynaliadwy. Croesewir eich sylwadau chi fel darllenwyr!

Morgan Parry yw Pennaeth WWF Cymru.

Wales *and the world*

by **Morgan Parry**

Natur Cymru has from the first edition attempted to chronicle the work of the Welsh Assembly Government as it affects nature conservation. This has been in recognition of the fact that considerable powers over site designation, agriculture, and planning were vested in the Assembly by the Government of Wales Act. It was also to acknowledge that social and economic policies affect the natural world every bit as much as environmental policies, and therefore nature is, and should be, a highly political issue in Wales.

But starting with this edition, this column will look at wider pressures on the natural world while still keeping an eye on the Assembly Government's work. Over the last few years, governments have been increasingly unwilling to legislate to protect the environment, or do anything meaningful to stem the dramatic global loss of biodiversity. Some argue that this reflects a decline in the power of governments, as business interests have taken control of the earth's natural resources. Without doubt, our lifestyles and our daily decisions as consumers are shaped by the technology-driven private sector, and governments are unwilling to interfere.

What then are the prospects for the second half of the decade? Although climate change is on the agenda of many nations, the Johannesburg summit of 2002 has faded from memory and left little in the way of a legacy. Even though we in Wales get richer by the year, economic growth is still the number one priority. Economic development to benefit the poor is clearly desirable, but economic development to further elevate the rich, in a world confronted by evidence of global limits, is an anachronism. All it does is convert natural resources and energy into pollution and entropy.

To the disappointment of many, Tony Blair's promises on climate change have proved to be hollow, leaving no credible champion for action on climate change in the rich countries of the world. Blair caved in to business lobbyists on the emissions trading scheme, and his officials have been negotiating to ditch altogether the UK's moderate targets for CO_2 reduction. His speech in Davos was equivocal to say the least. If human-induced climate change raises average global temperatures more than 2°C, the impact on species and habitats will be devastating. Climate change is the biggest threat facing humanity, and so it should be a big issue in the coming general election. But I bet it won't be!

Intensive agriculture (driven by the giant supermarkets) continues to impact on terrestrial ecosystems worldwide, and likewise over-fishing in the oceans. The continuing decline in marine biodiversity and economic viability of coastal communities could be addressed in the UK if the Government fulfils its promise and introduces comprehensive new legislation. But the ease with which the fishing industry got Ministers to ignore the advice of scientists and the European Commission before Christmas is not a promising sign of the Government's resolve.

If further evidence were needed that conservation of natural habitats benefits humanity, the Asian tsunami provided it. Coastlines that had healthy coral reefs and intact mangroves (which act as natural buffers) were less badly affected by the waves than those where reefs had been damaged and mangroves ripped out and replaced by prawn farms and beachfront tourist developments. But the message didn't get through to everyone in Wales: farmers were quick to react to recent stormy weather by calling for rivers to be dredged and wetlands drained, to prevent future flooding – exactly the opposite of what is required.

Natur Cymru is playing its part by popularizing the science of conservation biology. But it also needs to highlight farsighted legislation, enlightened policy making, responsible business decisions, beneficial technologies and more sustainable social trends. Readers' comments are welcomed!

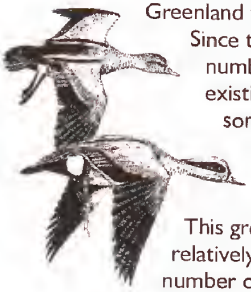
Morgan Parry is Head of WWF Cymru.

Coral reefs act as natural buffers against severe weather. Photo: Rohan Holt.

Nature *in reserve*

Russell Jones describes management at the RSPB's Ynys-hir reserve

Situated on the south side of the river Dyfi in Ceredigion, some five miles south of Machynlleth, Ynys-hir reserve was originally purchased by the RSPB in 1969, mainly for its western sessile oak woodland and the 55ha of salt-marshes, which held the only regular flock of wintering Greenland white-fronted geese in Wales. Since that date we have acquired a number of additional areas and the existing 600ha reserve now includes some 28 different habitat types and is part of the Dyfi SSSI and Biosphere reserve.



This great diversity of habitats in such a relatively small area ensures that the number of bird species regularly present is high for a west coast site. About 160 different species are seen every year and up to 80 species breed, including some which are decreasing rapidly throughout the county, such as yellowhammer and lapwing. The wealth of other wildlife also reflects this variety of habitats, with 28 butterfly, 15 dragonfly, 30 mammal and 358 'macro' moth species recorded over the last few years. These include a number of BAP priority species such as barbastelle bat, otter, dormouse, a weevil *Procas granulicollis* and a moth *Xestia Ashworthii*.

One of the main management achievements has been the eradication of rhododendron from most of the reserve's 85ha of woodland. In the light of the serious declines in numbers of breeding waders in Wales over the last ten years, the focus of management is now on the lowland wet grassland. We purchased 160ha of grassland in 2001 and achieved full control of the management over the original Ynys-hir reserve with the purchase of the existing farming tenancy from the tenant. Over the last three years over 5km of ditches have been re-profiled and 7km of fencing removed. The introduction of a number of pipe-dams and sluices means that full hydrological control over all of the grassland is now possible.

The main aim is to produce ideal conditions for breeding waders through grazing, mainly with cattle, achieving a sward height in the main lapwing nesting areas of a maximum of 5cm by the beginning of April, and one of about 10cm, but with a denser, more tussocky, structure in the main redshank nesting areas. The increase in breeding waders on the lowland grassland has been very encouraging: 79 pairs of lapwing nested in 2004 (17 in 2001) and 28 pairs of redshank. Raising the water levels in the winter period has also brought a large increase in the number of wildfowl and waders, with over 2000 golden plover, 2500 lapwing, 600 teal, 250 curlew and 130 redshank present this winter.

The next challenge? We plan to convert and restore 25 hectares of conifer plantation back into mire; an exciting opportunity to achieve a significant contribution towards the national BAP mire restoration target.

Russell Jones is warden at Ynys-hir reserve.

Landowners for wildlife

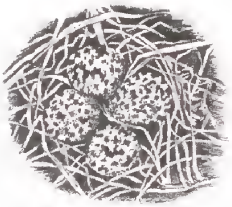
Nature Reserves come in many shapes and sizes. Some, such as the RSPB Ynys-hir reserve described above, have dedicated staff and detailed management plans. Others are areas of private land whose owners simply want to do their bit for wildlife, and enjoy the great pleasure of encouraging birds, butterflies and other wildlife on their land.

The Ceredigion Biodiversity Enhancement Scheme, run by the Shared Earth Trust, has brought together a network of such owners, who are restoring an astonishing array of wildlife habitats. The Trust organises site visits, promotes the exchange of information, answers management questions and provides help and advice.

If you live in Ceredigion, have a parcel of land which could be improved for wildlife and would like to join the network, please get in touch with the Shared Earth Trust at Denmark Farm, Betws Bledrws, Lampeter, Ceredigion SA48 8PB. Tel. 01570 493358. Email: set@denmark-farm.freeserve.co.uk

Nature *at large*

The lapwings of Aberkinsey Farm
by **Richard Roberts**



Take a highly productive, flat lowland farm and surround it on all four sides with conurbations and the wildlife will disappear, right? Well… not always. Aberkinsey Farm is a case in point. It lies on the flat lands of the Vale of Clwyd surrounded by the towns of Rhyl, Prestatyn, Dyserth and Rhuddlan – all busy and growing, especially in the summer when tourism swells the indigenous population.

Here David Jones, the tenant farmer, grows crops, lambs and high quality beef. The latter is supplied to Sainsbury's Traditional Beef range, and it was through this initiative that the Farming & Wildlife Advisory Group (FWAG) became involved. Sainsbury's asks its Traditional Beef suppliers to carry out a Biodiversity Action Plan (BAP) to identify four species which can be helped by conservation management.

FWAG produces the plan on their behalf, and so I visited Aberkinsey in September 2002 to begin the BAP process. The farm was interesting with several quality habitats such as woodland and a network of hedges, but nothing struck me as unique - until near the end of the visit. Walking across a field that had spent the year in set aside, suddenly the air was filled with lapwings with their distinctive two-tone call. There must have been more than 60 individuals gathering on their winter feeding grounds. "I don't suppose too many stay all year?" I asked. The enquiry was casual, the answer unexpected. Mr Jones told me there were at least 20 pairs breeding on the farm as a whole, and 12 pairs on this particular piece every year.

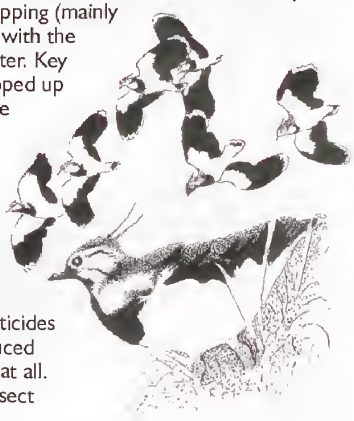
The piece of land in question covers about nine acres with a further 12 acres of spring cropping at the southern end, a network of streams and ditches bordering the field and a patch of rough grass in the middle that lies wet all year round. This is ideal habitat, but fragile, and could easily be altered by a change in cropping or drainage. Lapwing numbers are plunging due to loss of habitat and changes in farming practices. The RSPB estimate that between 1987 to 1998 the Welsh population fell by 77% and is still falling. When I told Mr Jones this, his response was instant.

"How do I help them?" he asked.

We agreed that the ideal way forward was through an agri-environment scheme. The Wales Tir Gofal (Land Care) scheme encompasses the whole farm but offers specific payments for habitats and their management. However, at the time the scheme was shut to new applicants and we needed a stopgap until the next window in 2003. We decided to ask the RSPB. Their prescription was to rough plough and leave fallow the favoured lapwing plot from the end of February/early March through to the end of June; to create a number of shallow depressions; and to spring crop surrounding fields. In the meantime FWAG had put together an application in readiness for Tir Gofal, and a 10 year agreement was duly signed in the spring of 2004. The enthusiasm of Mr Jones, his son Meilir and the Tir Gofal Project Officer Helen Clarke, has enabled Aberkinsey to quickly come up to speed.

So what does this involve?

The fallow period has been extended to mid-July whilst nesting habitats have been increased across the farm by a switch to spring cropping (mainly for wholecrop silage) with the stubbles left over winter. Key ditches are to be stopped up to raise the watertable and create wet grassland and a 'chick friendly' environment. These pastures will be cattle grazed in spring to produce the short sward that lapwings demand. Pesticides in general will be reduced and often not applied at all. This will encourage insect food sources such as sawflies and supply weed seeds over winter. The latter will have an important bearing on other species found at Aberkinsey, including linnets, tree sparrows, stock doves and yellowhammers – all declining farmland birds and seed eaters.



I recently returned to talk with Mr Jones about the Aberkinsey lapwings. He was disappointed that 2004 had not been a good breeding year: he thought that there was an increasing predator pressure on these ground nesters, with less than 10 pairs breeding across the farm, but he was optimistic that this was only a 'blip' and that once the necessary work had been done to the ditches and the scrapes then numbers would soon climb. As I was leaving, I couldn't resist asking why he had changed a lot of his farming policy and was often putting himself out to help a bird. "As I get older, I appreciate the wildlife around me more," he told me. And for the lapwings that can only be a good thing.

Richard Roberts is Farm Conservation Adviser with FWAG.

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Mai 5-6 May Technegau Hyfforddi Cyfranogol/Participative Training Techniques £225
Mai 9-13 May Cyflwyniad i'r NVC a'i defnydd ar gyfer Asesu a Rheoli Safleoedd/An Introduction to the NVC and its uses for Site Assessment and Management £404
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Meh 6-10 Jun Dulliau Arolygu ar gyfer Rhywogaethau a Warchodir a Rhywogaethau'r Cynllun Gweithredu Bioamrywiaeth/Surveying Methods for Protected and BAP Species £368
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www.nationalmothnight.info
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joan.daniels@english-nature.org.uk or visit www.english-nature.org.uk

Butterfly Conservation
EVENTS 2005
For an events programme please telephone 0870 770 6153 or email wales@butterfly-conservation.org

Millennium Coastal Path Project, Carmarthenshire EVENTS 2005
For the following events please contact Simeon Jones 01554 772 368
SLDJones@sirgar.gov.uk
17 Ebrill *Taith Sosbonelli: Côr y bore bach*. Gwarchodfa Natur Leol Pwll Lludw, Sir Gâr.
26 May *North Dock Dunes* Local Nature Reserve, Llanelli. Dunes in flower with Llanelli Naturalists.
9 Jul *Pwll Lagaon* Local Nature Reserve. Specialist flora of this former ash pit with Llanelli Naturalists.

Carmarthenshire LBAP partnership
CARMARTHENSHIRE WILD WEEKEND
20 Mar Spend a day in the reeds! Practical conservation open to all. National Wetlands Centre Wales, Penclacwydd. Contact Nigel Williams 01554 741 087.

Please book: 01492 575200.
Cardigan Bay Marine Wildlife Centre NEW WEBSITE contains news on latest sightings, surveys, volunteering, dolphin identification, games for children and much more. Take a look: www.cbmwc.org

North Wales Wildlife Trust Arfon Branch
For details of all events contact Kate Gibbs on 01248 681936
14 May *Farming for Nature*. Visit to an organic farm and wildlife site near Gaerwen. Leader: James Robertson, wildlife enthusiast and editor of *Natur Cymru*.
NATIONAL WILDLIFE WEEK
6 Jun 6pm *Cwm Idwal for Mountain Flowers*. Leader: John Good. Lower and higher level walks planned.
8 Jun 6.30pm *Nant Porth Quarry*. Leader: Richard Williams. Explore this interesting wood on the edge of the Menai Strait.
12 Jun *Wildlife Gardening* in Llanfairfechan. Visit a garden being changed to make it more wildlife friendly.
18 Jun Visit to *Nationol Wildflower Centre* Knowsley, near Liverpool.
2 Jul 10am *Coastal and Lowland Heath* visit to Mynydd Tir y Cwmwd, Llanbedrog. Leader: Jan Sherry.

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Ceredigion Farmers and Landowners wanting to help wildlife – see page 46.

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